CTX 1200

12 Channel
VHF/FM Marine
Radiotelephone

- Full 25 Watt transmit power
- Low power transmitter switch for in-harbor use
- Detachable microphone
- Front mounted speaker
- One crystal per channel programming

General Description

The CTX-1200 is the ideal VHF/FM radiotelephone for coastal cruising. With 12 channels to meet the most popular communication's needs and 25 Watt power, you can depend on it for reliability and safety when it really counts. Ruggedly constructed, the CTX-1200 has been engineered and manufactured to perform in the harshest marine environment. It is the ideal radiotelephone for all types and sizes of boats.

The transmitter section of this radiotelephone has been designed to exceed the requirement of intermittent marine service, which is defined as a 50% duty cycle of two minutes transmitting followed by a period of two minutes receiving. Operating the transmitter within these limits will also provide long useful service.

The unit features adjustable **Squelch** control, **25W-1W** transmitting power switch, and an RF power transistor protection circuit which protects the unit from possible damage due to excessive antenna mismatching or reflection loss. A convenient mounting bracket provides easy mounting under most conditions and permits quick removal for servicing etc.

Important. Before operating your radiotelephone, you must obtain your license. It is illegal to transmit without appropriate license which can be obtained by submitting completed FCC forms 506 and 753 to the FCC. Furthermore, you are required to read and understand the Part 83 of FCC Rules and Regulations prior to operation of this radiotelephone. It is the user's responsibility to see that this unit is operating at all times in accordance with the FCC Rules and Regulations.

Note. FCC forms 506 and 753 are packed with your unit.

Important

In compliance with certain state laws, the manufacturer of the equipment you have purchased, is required to provide suitable space in your operating manual to enable you to record the model and serial numbers on the equipment and to provide you with a description of the location of such numbers on the equipment. When you have entered the required information in the spaces provided below, you should retain the manual so that you have a permanent record of these serial and model numbers.

Unit Description: 12 Channel Marine VHF Radiotelephone

Model No.: CTX-1200

Serial No.
[Located on rear of unit]

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Specifications

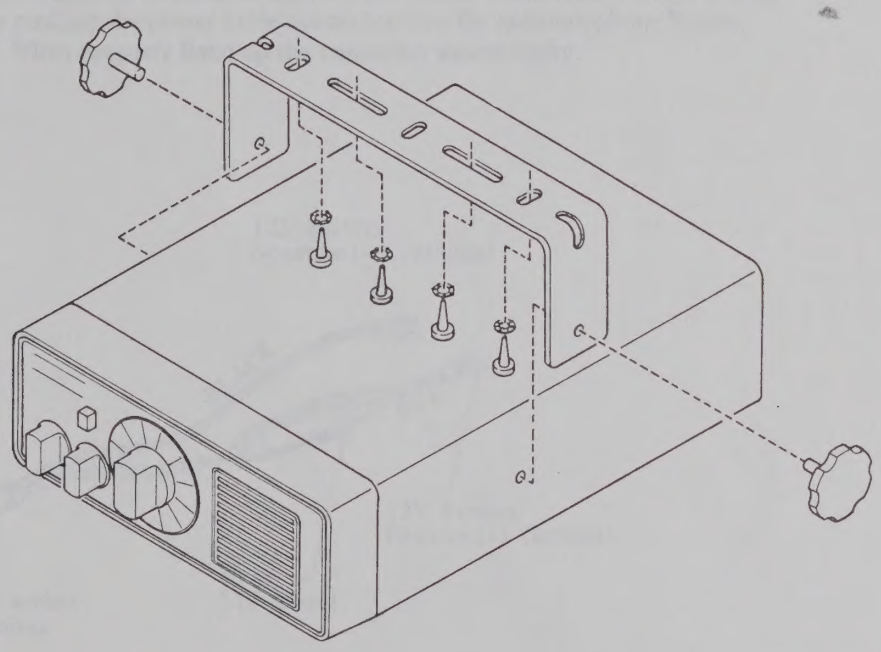
General:	
Frequency range:	
Transmitter:	156.00 – 157.50 MHz
Receiver:	156.00 – 163.00 MHz
Number of channels:	
Transmitter:	12 (10 supplied)
Receiver:	12
Supply voltage:	13.6 volts DC negative ground
Antenna impedance:	50 ohms
Modulation:	16F3
Microphone impedance:	600 – 2000 ohms
Current drain:	
Transmitter H/L:	5.0A/2.0A
Receiver stby/rated:	0.4A/1.0A
Temperature range:	–20°C to +50°C
FCC:	Part 83 & 15 DOC
Dimensions:	6-7/16"W x 2-1/2"H x 9-5/16"D (164 x 63 x 237 mm)
Weight:	Approx. 4.8 lbs. (2.2 kg)
Transmitter:	
Output power:	25W/1W
Deviation:	±5 kHz max. @ 1 kHz
Spurious & harmonics:	–65 dB
Audio frequency response:	+1, –3 dB, 300 – 3000 Hz
Distortion:	5%
Receiver:	
Sensitivity:	
–12 dB sinad:	0.3 μV
20 dB quieting:	0.35 μV
Squelch sensitivity:	
Threshold:	10 dB noise quieting
Tight:	2 μV
Modulation acceptance bandwidth:	±7 kHz
Spurious & image rejection:	–65 dB
Intermodulation rejection:	–60 dB
Selectivity:	–70 dB
Hum & noise:	–50 dB
Audio frequency response:	+1, –8 dB, 300 – 3000 Hz
Audio output 10% THD 4 ohms:	5 watts

Installation .

Following channels are already factory-installed and has been carefully calibrated:
06, 16, 22CG, 24, 25, 26, 27, 28, 68, 70, WX1 and **WX2.**
The unit may be operated on any other channels by the replacement of the crystals. When new channels are desired, refer to the section **Installing New Channels.**

Location. Before installing the radiotelephone, choose a location which is protected from moisture and excessive heat. Although designed for marine service, the unit should be protected from direct exposure to the elements. Also make sure the location chosen is one in which it is convenient to operate the unit.

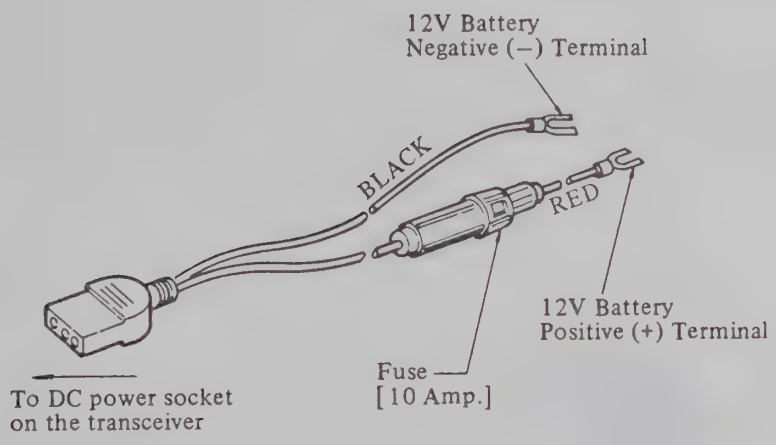
Mounting Bracket. The mounting bracket may be used for base type or gimble type overhead mounting. Remove the bracket by unscrewing the side thumb screws. Secure the bracket to the mounting surface by using at least 3 fairly large screws. Depending on the mounting location, you can use selftapping screws, or wood screws, washers, and nuts.



External Speaker Connection. The radiotelephone can be used with an external speaker system by making use of the **EXT SP** jack on the rear panel. Use 1/8" 2-conductor phone plug (miniature type), available at any radio equipment shops.

Power Connection

Important: This unit is designed for operation from 12 Volt negative ground electrical systems. Do not attempt to use it in a positive ground system.
The DC power cable is supplied to make the necessary DC voltage connections to boat's-battery line. Choose a point which is capable of handling approximately 6 amperes (never use a lighting circuit, for example). The **switched** side of the ignition switch is usually a suitable point for the **positive (+)** 12 Volt connection. Neatly run the power cable to this location. If you must extend the power leads, keep the wiring as short as possible, since long wires can cause a voltage drop which will affect the performance of the radiotelephone. Use #10 gauge wire for extensions up to 10 feet, and #8 gauge wire for longer extensions.
Connect the **red** fused lead to the **positive** battery line and the **black** wire to the hull ground, usually the same as the engine ground. In radiotelephone installation, the ground system is very important and has a great effect on communication range.
Reverse battery connections (reversing the battery polarity) will automatically actuate the protection circuit in the unit and cause the fuse to blow, thus protecting the unit from damage. If the fuse blows, turn the power swtich on the unit off and check for reverse battery connection. Replace the fuse with one having the same rating, 10A, since any fuses higher than this value may cause damage to the radiotelephone.
The other end of the DC power cable is terminated with a 3-pin female connector. Always line up the keyway properly before pushing the power cable connector into the radiotelephone socket. **Do not attempt to force it. When properly lined up the connector inserts easily.**



Antenna Connection

Use a VHF marine antenna which meets the 50 Ohm termination requirement. It should be mounted as high as possible for maximum range. Connect it to the antenna connector on rear panel of the unit, using 50 Ohm coaxial cable with a PL-259 connector terminated.
Since there are a large number of VHF marine antennas available, you should consult the dealer from whom you purchased the radiotelephone for further information on antennas that meet your specific needs.
Important. Do not attempt to transmit with no antenna (or with an improper antenna) connected. This may cause damage to the RF power transistors.

Function of Controls

❶ **Off/Volume Control.** To turn the power on, rotate the knob clockwise. Further rotation will increase the sound output level from speaker.

❷ **Squelch Control.** This control is used to eliminate annoying background noise when no signal is present. To adjust the **Squelch** control properly during reception, proceed as follows:

(1) Turn the knob counterclockwise until background noise is heard.

(2) Rotate the control slowly clockwise until background noise just disappears.

At this point, the rediotelephone will be relatively quiet under no signal conditions, but an incoming signal will overcome the squelch action and be heard.

Since this control is variable, it can be used to provide varying degrees of sensitivity to incoming signals. As the control is advanced from the extreme counterclockwise position the squelch action is progressively increased and stronger signals are needed to overcome it. To receive extremely weak signals or to disable the squelch circuit, simply turn the control fully counterclockwise.

❸ **25W-1W RF Power Selector.** This switch selects either 25 Watt or 1 Watt transmit power. With this switch in the 25 Watt position (released) the transceiver will produce the full rated 25 Watt transmit power for longer communication range. Depressing this switch will produce 1 Watt transmit power for local communication. It is suggested that the initial contact be made with high power and then switched to lower power to continue communications. This will be possible when the signal must travel only short distances. Switching to low power will cause less interference to other stations using the same frequency.

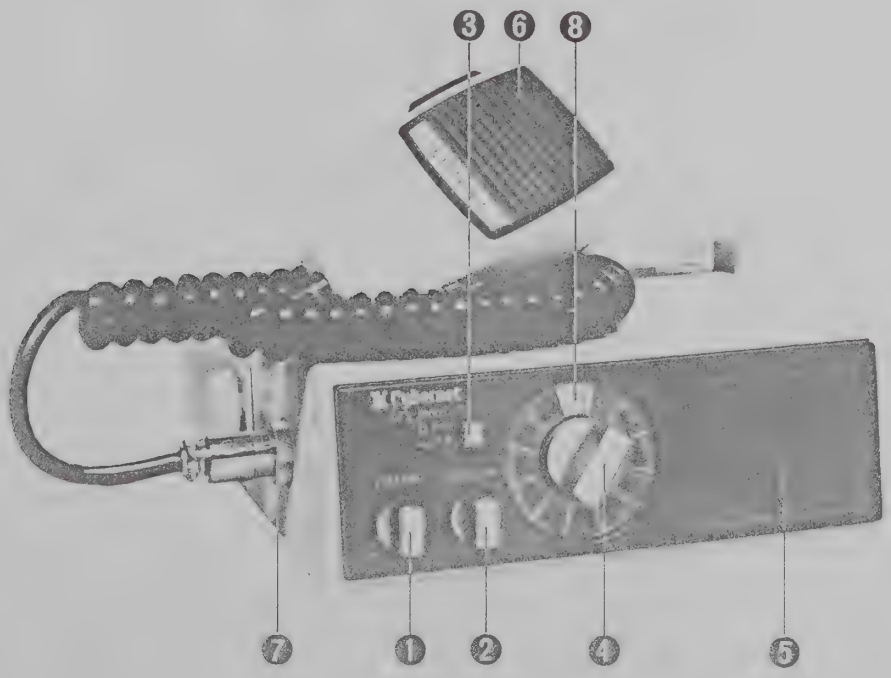
❹ **Channel Selector.** Continuously rotating this control selects one of 12 channels for transmit and receive operation. 12 channels have been already numbered because the crystals for these channels have been already installed in the factory. When new channels are desired, refer to the section **Installing New Channels.**

❺ **Speaker.** Built-in front mounted speaker.

❻ **Microphone.** With push-to-talk transmit switch.

❼ **Microphone Connector.** Used for connection of the microphone supplied with the radiotelephone.

❽ **Channel Window.** Lights up to indicate the channel selected. When transmitting, this window turns red.



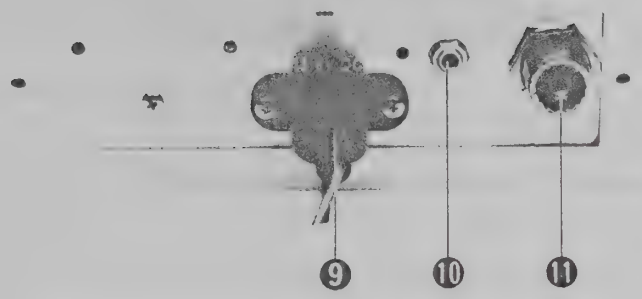
Rear Panel Connectors

❾ **13.6V Power Socket.** DC power to operate the unit is fed through this socket using the DC power cables supplied. The socket has 3 pins spaced unevenly and allows the power plug at the end of the power calbes inserted in only one way. Align the plug onto the socket pins and do not force it.

❿ **External Speaker Jack.** This jack is used for an external speaker (or horn). Insertion of the speaker plug (standard type, 1/8" 'phone' plug) in this jack automatically silences the built-in speaker.

Note. A protective rubber seal cap is installed over this jack. Do not remove it unless you are using the external jack.

⓫ **SO-239 Antenna Connector.** Accepts a PL-259 antenna connector. The cable from an antenna should be terminated with this type of 50 Ohm connector.



Operation

Weather Reception
The United States weather bureau broadcasts official weather conditions from certain locations on various frequencies. This transceiver is capable of receiving these transmissions. Consult your local weather bureau office for further information concerning these services.
To receive weather broadcast, simply rotate the channel selector to WX-1 (162.550 MHz) or WX-2 (162.400 MHz).
The radiotelephone will not transmit on these two channels even though you depress the transmit switch on the microphone.

Transmit and Receive Operating Procedure
Before operating the radiotelephone transmitter you must meet all requirements as set up by the local government agency in charge of communications in your country. In most countries this includes obtaining a proper license and having access to the rules and regulations covering this type of equipment.

Operating the Radiotelephone
(1) Properly install the radiotelephone in accordance with the **Installation** instructions in this manual.
(2) Turn the radiotelephone on and raise the volume until the background noise is heard. Be sure to turn the **Squelch** control to its fullest counterclockwise position initially, then refer to **Function of Controls** section for proper squelch adjustment.
(3) Select the transmit power with the **25W-1W Power selector.**
(4) To transmit, press the push-to-talk button on the side of the microphone and speak slowly, clearly, and in your normal tone with the microphone about 2 inches from your lips.
The Channel Window lamp will turn red indicating that the transmitter is operating.
(5) To receive, simply release the push-to-talk button.
Note. During periods of transmission, the receiver is silenced and reception is therefore impossible. In the same way, your signal cannot be heard by another station when he is transmitting.

Proper Radio Communications Procedure
(1) Do not shout into the microphone. Speak in a normal tone with your mouth about 2 inches from the microphone.
(2) Do not use the radiotelephone except for meaningfull communications.
(3) Listen to a channel before transmitting on it. You may be interrupting important communications.
(4) Always identify your boat by giving its call sign and name at the beginning and end of each message.
(5) Keep a log book of all distress, emergency, navigation, and safety type of information. Note the date, time, call letters and names of all ships involved and the content of the message. The log book should be signed by the person making entries.
(6) It is against the law to use profane or obscene comments on the radio. Remember you are transmitting on a party line.

Noise Interference

Several noise suppression kits are available which include all necessary parts and instructions. Alternatively, you can contact your nearest marine electronics maintenance shop to correct any ignition interference problem.

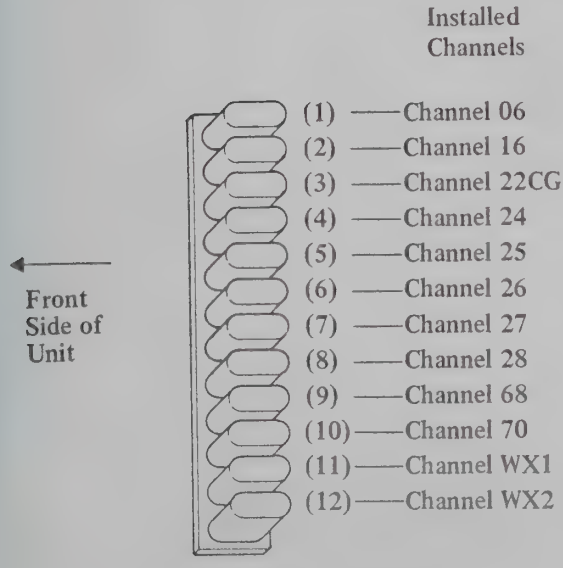
Installing New Channels

New channels may be installed by replacing a receive crystal for each channel desired, transmit frequency being automatically synthesized by the special phase-locked loop circuitry.
Crystals may be ordered from your Cybernet dealer.
For the channels and frequencies available, see the **Comprehensive VHF Marine Radiotelephone Channels** on the last page. Consult your local marine dealer or coast guard office for active channels in your area. When new crystals are installed in the radiotelephone, it must be aligned for the new receive and transmit channel frequencies. This procedure must be performed by an authorized person, the holder of a current first or second class radiotelephone license.

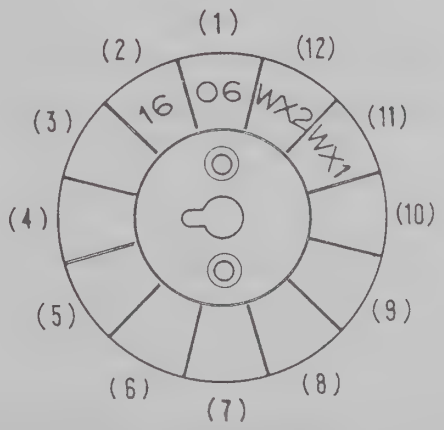
Crystal Replacement. As previously stated, new channels may be easily installed in the radiotelephone by simply inserting new crystal into the applicable crystal socket provided on the circuit board inside the unit. A simple alignment is also necessary to tune the unit to the exact transmit and receive frequencies allocated.
Important. The FCC requires that any adjustment of the frequency of a radiotelephone should be performed by a technician holding a first or second class radiotelephone license or equivalent.
Select the new channels desired after referring to the **receive** frequency listed in the **Comprehensive VHF FM Marine Radiotelephone Channels** in this manual.
The crystals to be inserted for new channels can be calculated from the following formula:

$$\text{Crystal Frequency} = \frac{\text{Receive Frequency} - 11.7}{9} \text{ MHz}$$

To install crystals, proceed as follows (To determine the duplex, simplex or receive-only mode, refer to the **Jumper Installation** drawing on next page for proper jumper arrangement):
(1) Remove the sleeve cover of the radiotelephone by removing 2 screws at the rear of the cabinet.
(2) Turn the unit upside down – the receive crystal sockets and terminals for mode-determination are located toward the front of the chassis as shown.
(3) Each channel socket and mode determination terminal is marked 1 through 12 corresponding to the positions on the Channel selector dial as shown.
(4) Replace the channel selector dial to the one supplied separately.
(5) Remove the factory-installed crystal.
(6) Insert a crystal for the particular channel.
(7) Affix the appropriate channel decal in the proper position on the channel selector dial. Make sure the crystals are installed in their correct position.



This unit has factory-installed crystals in all positions.



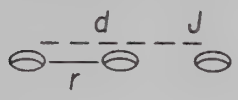
Note. No numbers, (1), (2), (3), . . . (12), are marked on the channel selector dial, but each channel position designated by (1), (2), (3), . . . (12), corresponds to the crystal socket, respectively.

Jumper Installation

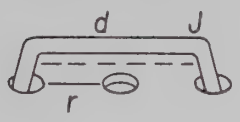
Refer to the Example of Wire Arrangement pictures to change the jumper arrangement in accordance with the condition of channels newly installed (whether it is a simplex mode channel or duplex mode channel). This is necessary to prevent illegal operation.

Example of Jumper Wire Arrangement

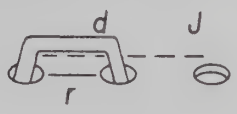
1) Simplex Mode. No connection.

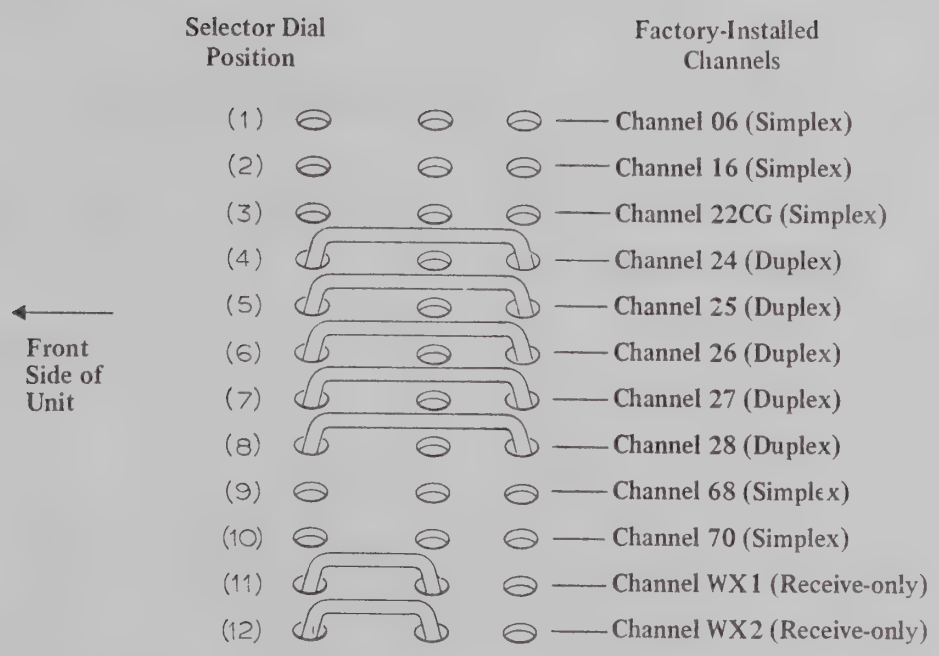


2) Duplex Mode. Over D.



3) Receive-Only Mode. Over R.





Caution. When cutting off wires, use care not to damage peripheral parts by scratching them with the nipper. If a receive-only mode channel is installed in any of above positions, refer to WX1 or WX2 wiring in jumper drawing.

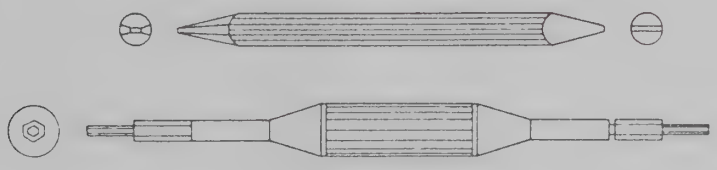
Alignment Procedure

The CTX-1200 has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the unit may be realigned as indicated herein after.
It is recommended that you do not try to adjust any circuit in this radiotelephone unless you entirely understand circuit operation and have enough knowledge and experience in the field of marine radiotelephone and high quality testing equipment.
Since the radiotelephone is most precise and sophisticated, tampering with the unit may cause upsetting the alignment and lowers its performance.

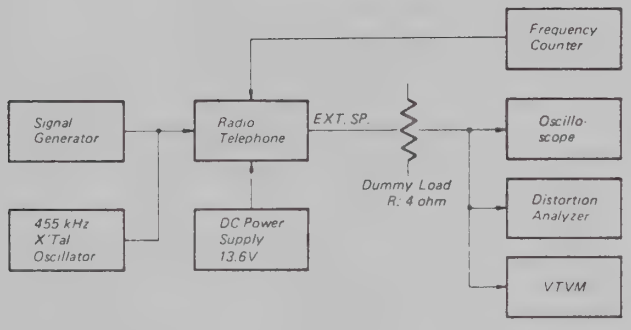
Equipment Required

Following equipment are required for the alignment and should be calibrated properly:

(1) Regulated DC power supply, 0 – 20V, 10A or higher.
(2) Audio signal generator, 10 Hz to 20 kHz.
(3) RF VTVM, probe type, 150 MHz.
(4) Circuit tester or digital Voltmeter.
(5) Frequency counter, 0 – 250 MHz, high input impedance.
(6) Deviation meter.
(7) Synchroscope.
(8) RF dummy resistor, 50 Ohm, 30W.
(9) RF power meter, 50 Ohms, 30W.
(10) T-coupler.
(11) Nonmetallic drivers, as shown.



Receiver Alignment Set-Up



Receiver Alignment

STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	T6, T7 [1st Local Multiplier/Q6]	TP1	1) Connect tester to TP1 (+) and chassis ground (–). 2) Place the Channel selector in *16* (156.300 MHz). 3) Adjust T7 for maximum voltage on tester. 4) Place the channel selector in WX2 (162.400 MHz). 5) Adjust T6 for maximum reading. 6) Repeat above steps so that the voltage falls in 1.5V at both frequencies. *Note: Due to being critical, use special care for this alignment.*
2	T8, T9 [1st Local Multiplier/Q7]	TP3	1) Connect tester to TP3 (+) and chassis ground (–). 2) Set the Channel selector to WX2 (162.400 MHz). 3) Adjust T8 and T9 alternatively for maximum voltage. Use hex-driver. *Note: 2.5V should be obtained normally.*
3	T1, T2, T3, T4, T5, T10, T11, T12 [RX RF Amplifier, RX 1st Mixer]	TP4, TP5	1) Select WX2 (162.400 MHz) to receive. 2) Adjust signal generator to 162.400 MHz with relatively high level. 3) Connect tester to TP5 (+) and to the chassis (–). 4) Adjust signal generator frequency so that tester indicates *0* V. 5) Move tester to TP4 (+) and to the chassis (–). 6) Adjust T1, T2, T3, T4, T5, T10, T11 and T12 in turns, for maximum reading on tester. *Note: If the tester indication is saturated, decrease the generator output to lower. Tester reading should always be around 1.5V. Use special care for this alignment.*
4	T1, T5 [RX RF Amplifier/Q1]	TP4, TP5	1) Set the Channel selector to *16* (156.300 MHz). 2) Set the signal generator output to 156.300 MHz. 3) Connect tester to TP5 (+) and chassis (–). 4) Adjust signal generator frequency so that tester indicates *0* V. 5) Move tester leads to TP4 (+) and chassis (–). 6) Adjust signal generator so that the tester indicates 1.5V. 7) Adjust T1 and T5 for maximum on tester. *Note: Decrease generator output level to always keep the tester reading around 1.5V.*
5	–	TP4	1) Set generator output to *10* dB. 2) Connect tester to TP4 (+) and chassis (–). 3) Check tester reading on following channels (frequencies) for 2V or more, respectively. *Channel 6 (156.300 MHz), Channel 16 (156.800 MHz), Channel 26 (161.900 MHz), WX2 (162.400 MHz)*

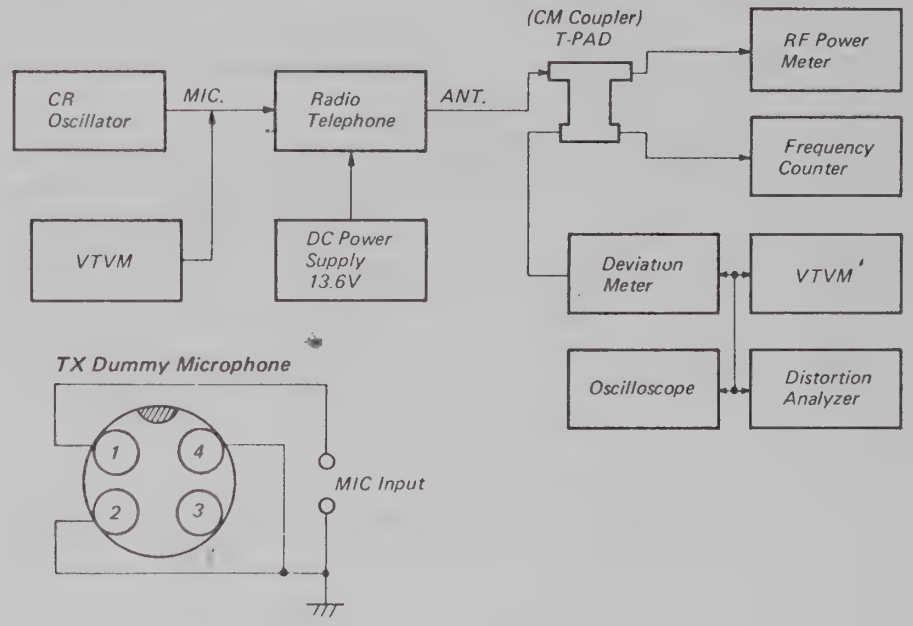
STEP	ADJUSTMENT	TEST POINT	PROCEDURE
6	T10, T11	TP4	1) Set the Channel selector to *16* (156.800 MHz). 2) Connect tester to TP4 (+) and chassis (–). 3) Set the unit no signal condition (short antenna receptacle, if necessary). 4) Adjust T10 and T11 for maximum. *Note: Tester should indicate about 0.3V.*
7	CT1 through CT12	Cathode of D8	1) Connect frequency counter to the cathode of D8 and chassis ground. 2) Refering to channel frequency chart, adjust each trimmer corresponding to the channel for a frequency 11.7 MHz lower than the assigned channel frequency. The tolerance within ±100 Hz is acceptable. Frequency counter should read, Channel frequency – 11.7 (MHz).

Test Point Voltage Chart

Test Point	*Applicable Circuit Tested*	*Standard Voltage*
TP1	RX 1st Local Multiplier (Q7)	1.0 (1.0–2.0)V
TP2	RX 1st Local Multiplier (Q7)	1 ~ 1.5V
TP3	RX 1st Mixer (Q2)	1.5 (1.0–2.0)V
TP4	IF Amplifier (IC1)	1.5V
TP5	Discriminator (D5, D6)	0V
TP6	TX Buffer (Q21)	0.5 (0.5–1.0)V
TP7	TX Buffer (Q22)	0.25 (0.2–0.7)V*
TP8	VCO (Q12)	1.8–2.2V

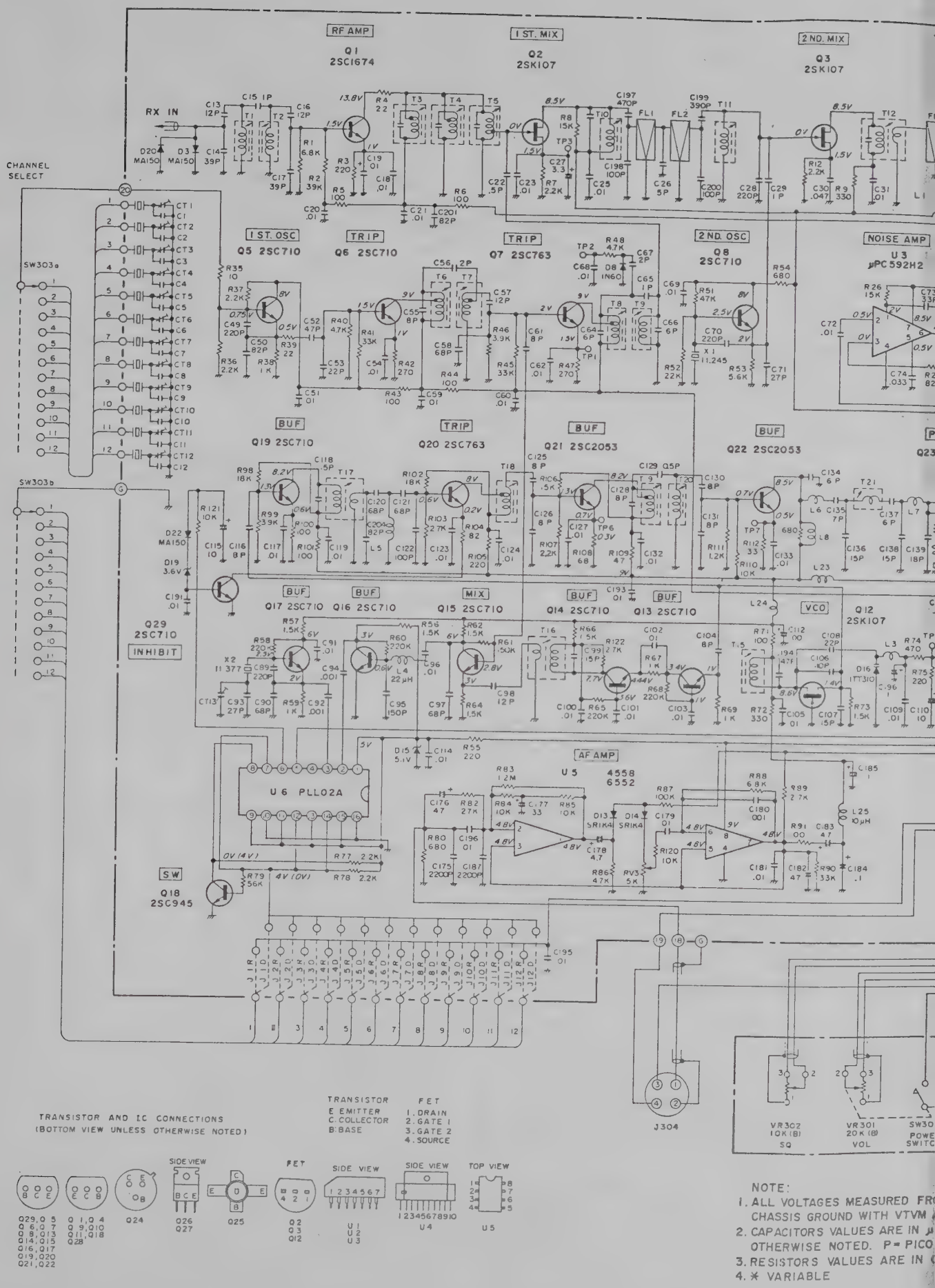
** at channel 06.*

Transmitter Alignment Set-Up



TX Alignment

STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	T17, T18 [TX Multiplier Q20, 21, 22]	TP6	1) Connect tester between TP6 (+) and chassis (–). 2) Adjust T17 and T18 for maximum (1.3V).
2	T19, T20	TP7	1) Connect tester to TP7 (+) and chassis (–). 2) Adjust T19 and T20 for maximum (1.3V).
3	T21		1) Adjust T21 for maximum power output on the RF Wattmeter connected to the antenna socket.
4	CT14, CT15 [Q23, Q24, Q25]		1) Adjust CT14 and CT15 for maximum reading on Wattmeter connected to antenna socket. 2) Repeat above for no further improvement. *Note: The Wattmeter should indicate around 28W.*
5	RV1, RV2 [APC]		1) Adjust RV1 so that RF power meter (external) indicates 25W ± 0.5W. 2) Place the *25W-1W* Power select switch in *1W* position (depressed). 3) Adjust RV2 to obtain 0.8W ± 0.1W.
6	RV3 [Modulation]		1) Connect audio signal generator to microphone input circuit. Feed 20 mV, 1,000 Hz audio. 2) Connect deviation meter to antenna through the T-pad (CM coupler). 3) Adjust RV3 so that 4.8 kHz deviation is achieved. 4) Reduce generator audio level to 3 mV, 1,000 Hz. 5) Check more than 3 kHz deviation is obtained. 6) Increase generator audio level to 0.2V, 1,000 Hz. 7) Check deviation is less than 5.0 kHz.
7	T15 [VCO]	TP8	1) Connect Tester between TP8 and chassis (–). 2) Transmit at Ch. 6. 3) Adjust T15 to get 2V.
8	T16 [buffer]	Pin 2 of U-6(PLL02A)	1) Touch probe of oscilloscope to Pin. 2 of U-6 (PLL02A) and connect earth lead of the probe to the nearest chassis point. 2) Transmit at Ch. 6. 3) Adjust T16 to get maximum amplitude on the oscilloscope.
9	CT13 [Ref. Osc.]	Pin 3 of U-6	1) Connect frequency counter to pin 3 of U-6. 2) Adjust CT3 for 11.3777 MHz. The tolerance within ±100 Hz is acceptable.



TRANSISTOR AND IC CONNECTIONS
(BOTTOM VIEW UNLESS OTHERWISE NOTED)

TRANSISTOR
E EMITTER
C COLLECTOR
B BASE

FET
1. DRAIN
2. GATE 1
3. GATE 2
4. SOURCE

Q29,0 5
Q 6,0 7
Q 8,013
Q14,015
Q16,017
Q19,020
Q21,022

Q 1,0 4
Q 9,010
Q11,018
Q28

Q24

SIDE VIEW
Q26
Q27

Q25

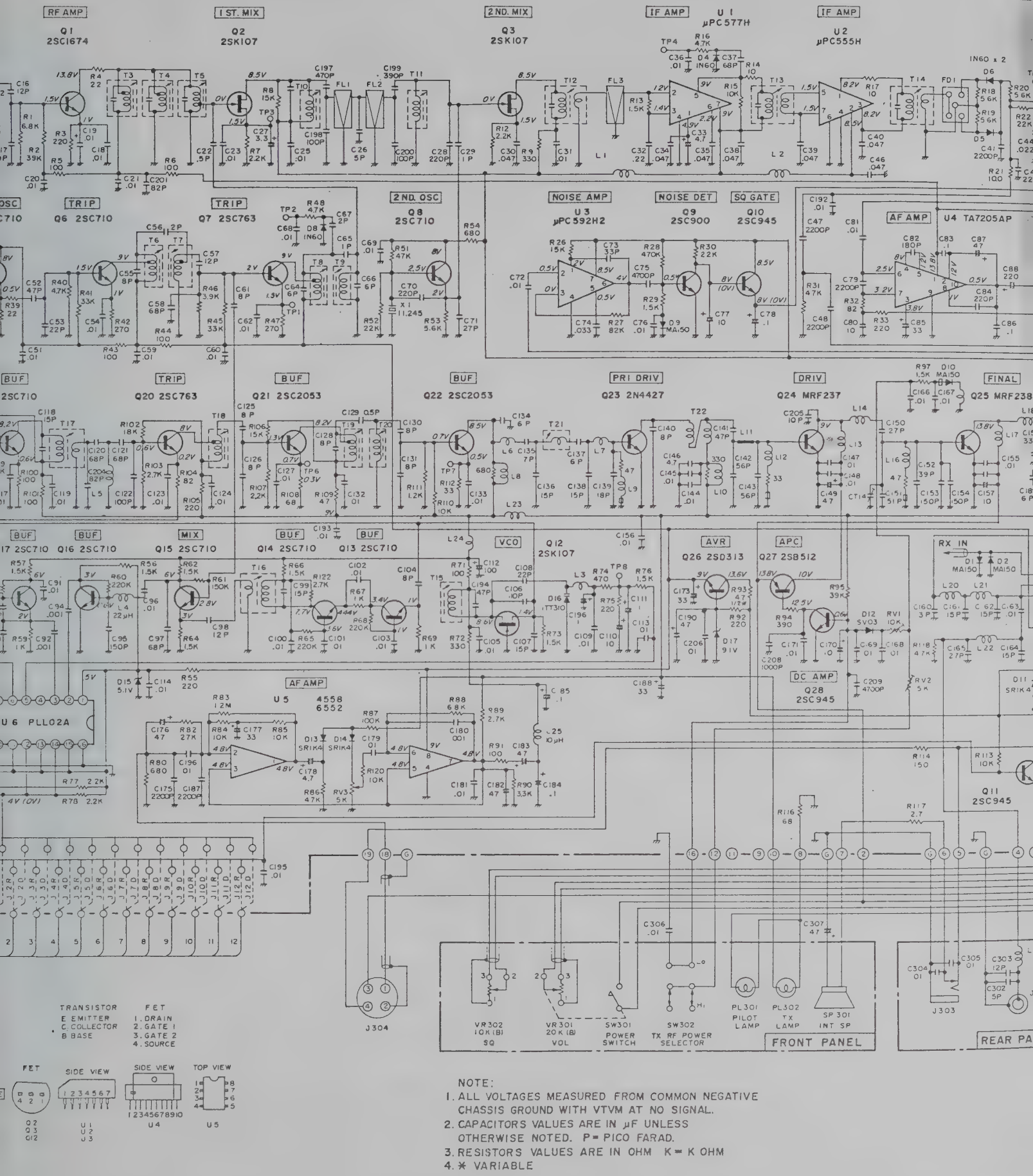
FET
Q2
Q3
Q12

SIDE VIEW
U1
U2
U3

SIDE VIEW
U4

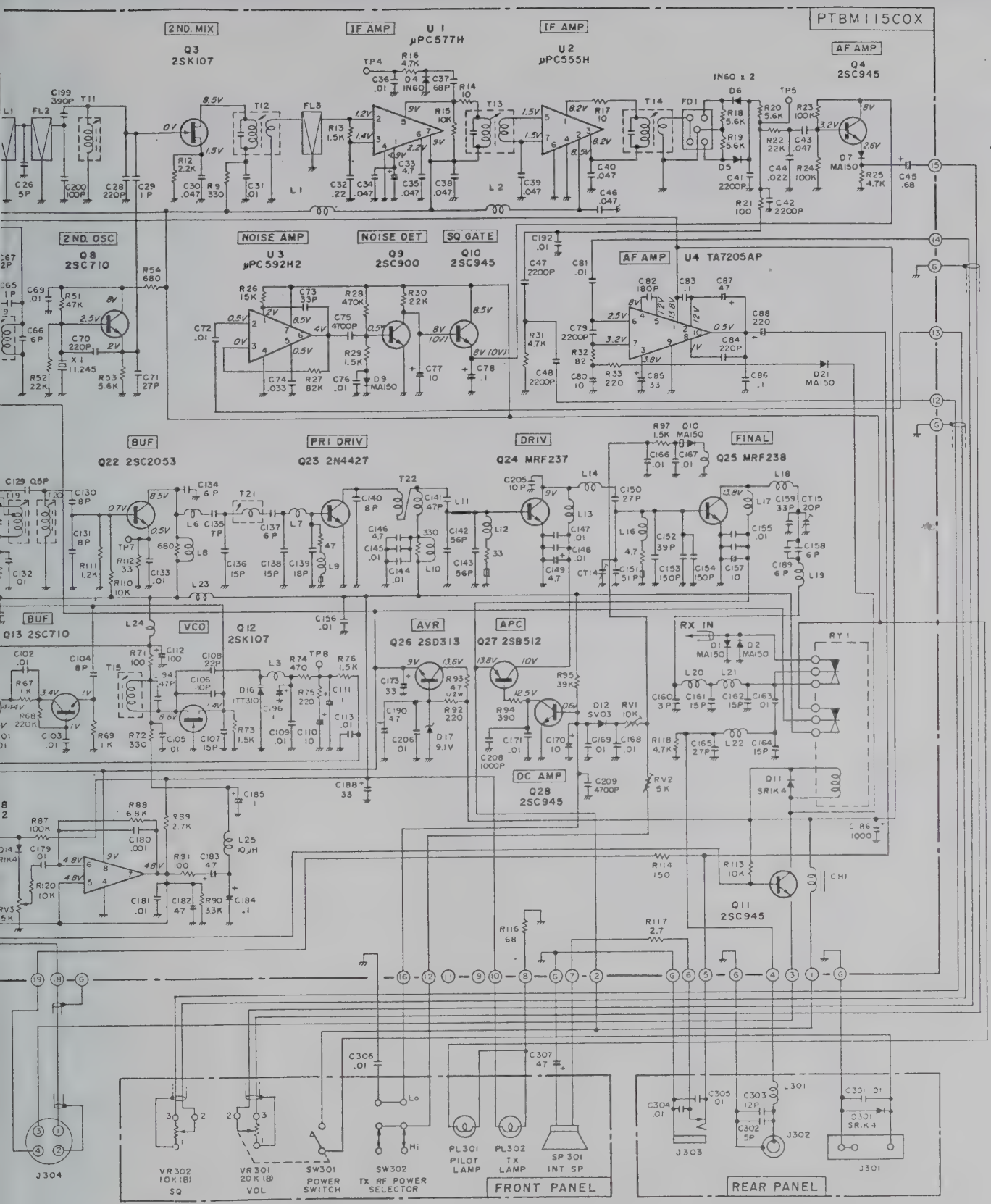
TOP VIEW
U5

NOTE:
1. ALL VOLTAGES MEASURED FR
CHASSIS GROUND WITH VTVM
2. CAPACITORS VALUES ARE IN μ
OTHERWISE NOTED. P= PICO
3. RESISTORS VALUES ARE IN
4. * VARIABLE



NOTE:

1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE CHASSIS GROUND WITH VTVM AT NO SIGNAL.
2. CAPACITORS VALUES ARE IN μF UNLESS OTHERWISE NOTED. P = PICO FARAD.
3. RESISTORS VALUES ARE IN OHM K = K OHM
4. ✱ VARIABLE

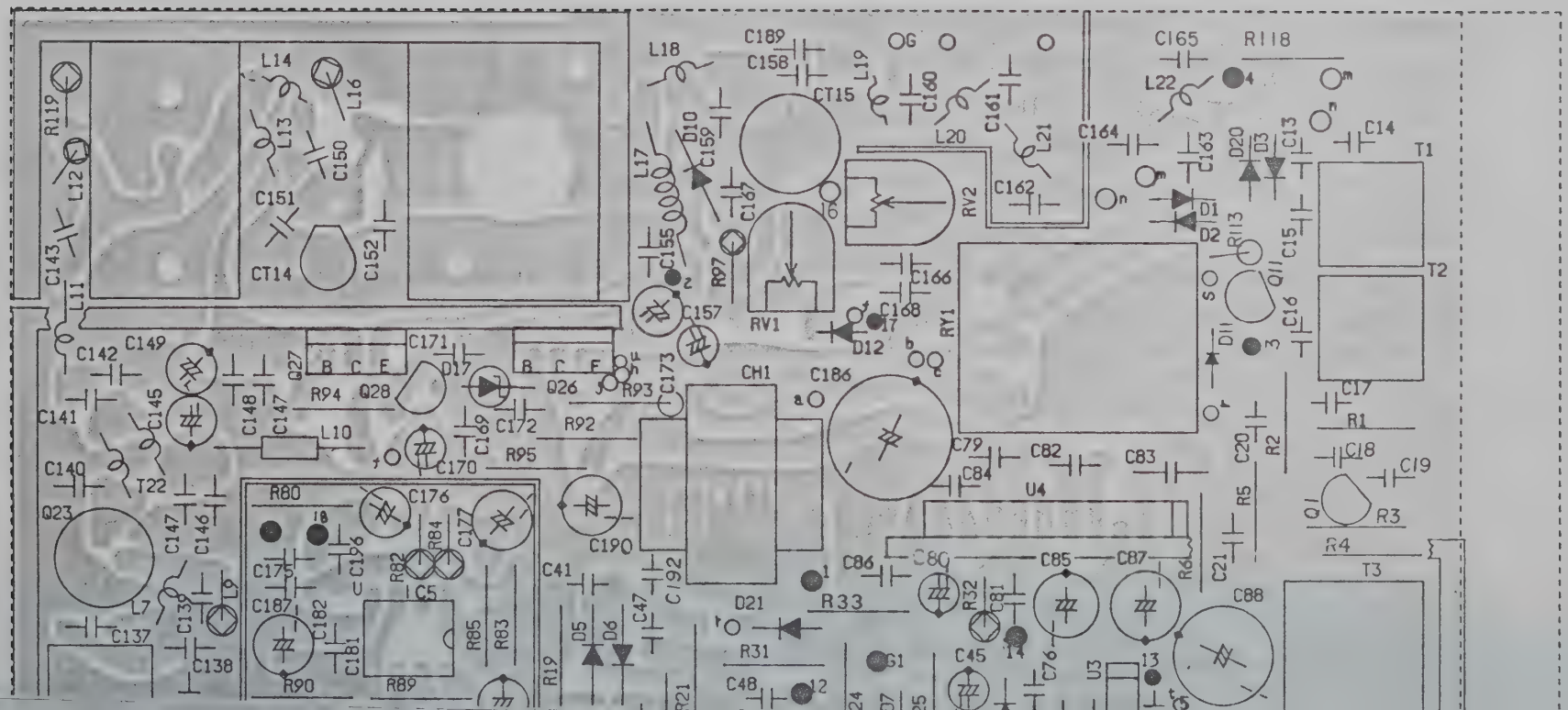


NOTE:
1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE CHASSIS GROUND WITH VTVM AT NO SIGNAL.
2. CAPACITORS VALUES ARE IN μF UNLESS OTHERWISE NOTED. P = PICO FARAD.
3. RESISTORS VALUES ARE IN OHM K = K OHM
4. * VARIABLE

PTBM115E0X

PTBM115E0X

Circuit Board Layout



Replacement Part List

	PART NAME	PART CODE	
	ELEC. ELEMENTS	EM851AACAL1	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				QTY USED
1	EXPLODED	APTBM115BA		P.W.BOARD ASSY						1
2		CCDE050CCM		CERAMIC CAP.	CH 5PF 500V -0.25, +0.25PF	C302				1
3		CCDE120KCM		CERAMIC CAP.	12PF 500V -10, +10% CH	C303				1
4		CEAE470ZLS		ELYT. CAPACITOR	47MFD 25V SP	C307				1
5		CKDB102PEM		CERAMIC CAP.	1000PF 50V -0, +100% E	C308	C309	C310		3
6		CKDB103PEM		CERAMIC CAP.	0.01MFD 50V -0, +100% E	C301	C304	C305	C306	4
7		GTX1200A02		WIRES KIT						1
8		LAIGG07C3A		RF COIL		L301				1
9		ML322SD002		SHIELD ANT						1
10		QDSSR1KX4P		SILICON DIODE	SR1K-4 VP=200 4-RANK 25MIN	D301				1
11		RVNA203B08		VR.		VR302				1
12		RVNB103A12		VR.		SW301				1
13		SR01AAX32A		PUSH SWITCH		SW302				1
14		SR0212209E		ROTARY SWITCH		SW303				1
15		XCR1A4WX1T		XTAL OSCILLATOR	HC-25/U 162.550MHZ WX1	WX1				1
16		XCR1A4WX2T		XTAL OSCILLATOR	HC-25/U 162.400MHZ WX2	WX2				1
17		XCR1A4060T		XTAL OSCILLATOR	HC-25/U 156.300MHZ 6CH	CH06				1
18		XCR1A4160T		XTAL OSCILLATOR	HC-25/U 156.800MHZ 16CH	CH16				1
19		XCR1A4220T		XTAL OSCILLATOR	HC-25/U 157.100MHZ 22CGCH	CH22C				1
20		XCR1A4240T		XTAL OSCILLATOR	HC-25/U 161.800MHZ 24CH	CH24				1
21		XCR1A4250T		XTAL OSCILLATOR	HC-25/U 161.850MHZ 25CH	CH25				1

	PART NAME	PART CODE	
	ELEC. ELEMENTS	EMB51AACALJ	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC	Q'TY USED
1		XCR1A426DT		XTAL OSCILLATOR	HC-25/U 161.900MHZ 26CH	CH26	1
2		XCR1A427DT		XTAL OSCILLATOR		CH27	1
3		XCR1A428DT		XTAL OSCILLATOR	HC-25/U 162.000MHZ 28CH	CH28	1
4		XCR1A468DT		XTAL OSCILLATOR	HC-25/U 156.425MHZ 68CH	CH68	1
5		XCR1A470DT		XTAL OSCILLATOR	HC-25/U 156.525MHZ 70CH	CH70	1
6		YFLCCC0005		FERRITE BEAD			1
7		YJB02S001U		DC JACK		J301	1
8		YJC02S009Z		JACK		J302	1
9		YJT03S003Z		3P JACK		J303	1
10		YJZ04S008Z		4P MIC JACK		J304	1
11		ZPA064101U		LAMP		PL301	1
12		ZPA064136U		LAMP		PL302	1
13		ZSA07C0803		SPEAKER		SP301	1
14							
15							
16							
17							
18							
19							
20							
21							

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		BNHCL30NSN		NUT	M3, S-NI, THIN-TYPE					3
2		BSPB2606NN		BIND HEAD SCREW	(+)BIT, M2.6 X 6 S-NI					2
3		BSPB3006NN		BIND HEAD SCREW	(+)BIT, M3 X 6 S-NI					2
4		BSPB3008NN		BIND HEAD SCREW	(+)BIT, M3 X 8 S-NI					2
5		BSPB3010NN		BIND HEAD SCREW	(+)BIT, M3 X 10 S-NI					2
6		BSPP3006NT		PAN HEAD SCREW	(+)BIT, M3 X 6 PLASTIC					2
7		BTPP3006AN		PAN TAP SCREW	(+)BIT, M3 X 6 S-NI					2
8		BWU2658?SW		IT. LOCK WASHER	INSIDE TOOTHED, 2.6M/M S-ZN					1
9		BWU3065?SW		IT. LOCK WASHER	INSIDE TOOTHED, 3 M/M S-ZN					9
10		CBD1B104MM		CERAMIC CAP.	0.1MFD 12.5V -20, +20%	C83	C86			2
11		CCDB0R5CCM		CERAMIC CAP.	CK 0.5PF 50V -0.25, +0.25PF	C129	C22			2
12		CCDB010CCM		CERAMIC CAP.	CK 1PF 50V -0.25, +0.25PF	C15	C29			2
13		CCDB010CPM		CERAMIC CAP.	PK 1PF 50V -0.25, +0.25PF	C65				1
14		CCDB020CPM		CERAMIC CAP.	PK 2PF 50V -0.25, +0.25PF	C56	C67			2
15		CCDB050CPM		CERAMIC CAP.	PH 5PF 50V -0.25, +0.25PF	C26				1
16		CCDB060CCM		CERAMIC CAP.	CH 6PF 50V -0.25, +0.25PF	C134				1
17		CCDB060CPM		CERAMIC CAP.	PH 6PF 50V -0.25, +0.25PF	C64	C66			2
18		CCDB070CCM		CERAMIC CAP.	CH 7PF 50V -0.25, +0.25PF	C135				1
19		CCDB070DPM		CERAMIC CAP.	PH 7PF 50V -0.5, +0.5PF	C118	C128			2
20		CCDB080DCM		CERAMIC CAP.		C137				1
21		CCDB080DPM		CERAMIC CAP.	PH 8PF 50V -0.5, +0.5PF	C104	C116	C125	C130	6

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1						C55	C61			
2		CCDB120DPM		CERAMIC CAP.	PH 10PF 50V -0.5, +0.5PF	C106				1
3		CCDB101KPM		CERAMIC CAP.	100PF 50V -10, +10% PH	C122	C198	C200		3
4		CCDB120KPM		CERAMIC CAP.	12PF 50V -10, +10% PH	C13	C16	C57	C98	4
5		CCDB150KCM		CERAMIC CAP.	15PF 50V -10, +10% CH	C136	C138			2
6		CCDB150KPM		CERAMIC CAP.	15PF 50V -10, +10% PH	C107	C99			2
7		CCDB151KPM		CERAMIC CAP.	150PF 50V -10, +10% PH	C95				1
8		CCDB180KCM		CERAMIC CAP.	18PF 50V -10, +10% CH	C139				1
9		CCDB180KPM		CERAMIC CAP.	18PF 50V -10, +10% PH	C126				1
10		CCDB181KOM		CERAMIC CAP.	180PF 50V -10, +10% SL	C82				1
11		CCDB220KPM		CERAMIC CAP.	22PF 50V -10, +10% PH	C108	C131	C53		3
12		CCDB221KPM		CERAMIC CAP.	220PF 50V -10, +10% PH	C49	C70	C89		3
13		CCDB221KUM		CERAMIC CAP.	220PF 50V -10, +10% UJ	C84				1
14		CCDB270KPM		CERAMIC CAP.	27PF 50V -10, +10% PH	C71	C93			2
15		CCDB330KPM		CERAMIC CAP.	33PF 50V -10, +10% PH	C1	C10	C11	C12	13
16						C2	C3	C4	C5	
17						C6	C7	C73	C8	
18						C9				
19		CCDB390KPM		CERAMIC CAP.	39PF 50V -10, +10% PH	C14	C17			2
20		CCDB391KOM		CERAMIC CAP.	390PF 50V -10, +10% SL	C199				1
21		CCDB470KPM		CERAMIC CAP.	47PF 50V -10, +10% PH	C52				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS			SYMBOLIC				Q'TY USED
1		CCDB471KCM		CERAMIC CAP.	470PF	50V	-10, +10% SL	C197				1
2		CCDB680KCM		CERAMIC CAP.	68PF	50V	-10, +10% PH	C120	C121	C37	C58	6
3								C90	C97			
4		CCDB820KCM		CERAMIC CAP.	82PF	50V	-10, +10% PH	C204	C50			2
5		CCDE030CCM		CERAMIC CAP.	CJ 3PF	500V	-0.25, +0.25PF	C160				1
6		CCDE060DCM		CERAMIC CAP.				C158	C189			2
7		CCDE100DCM		CERAMIC CAP.	CH 10PF	500V	-0.5, +0.5PF	C205				1
8		CCDE120KCM		CERAMIC CAP.	12PF	500V	-10, +10% CH	C140				1
9		CCDE150KCM		CERAMIC CAP.	15PF	500V	-10, +10% CH	C161	C162			2
10		CCDE151KCM		CERAMIC CAP.	150PF	500V	-10, +10% SL	C153	C154			2
11		CCDE180KCM		CERAMIC CAP.				C164				1
12		CCDE220KCM		CERAMIC CAP.	22PF	500V	-10, +10% CH	C165				1
13		CCDE330KCM		CERAMIC CAP.	33PF	500V	-10, +10% CH	C159				1
14		CCDE390KCM		CERAMIC CAP.	39PF	500V	-10, +10% CH	C150	C152			2
15		CCDE470KCM		CERAMIC CAP.	47PF	500V	-10, +10% CH	C141	C194			2
16		CCDE510KCM		CERAMIC CAP.	51PF	500V	-10, +10% CH	C151				1
17		CCDE560KCM		CERAMIC CAP.	56PF	500V	-10, +10% CH	C143				1
18		CCDE680KCM		CERAMIC CAP.	68PF	500V	-10, +10% CH	C142				1
19		CCDE820KCM		CERAMIC CAP.	82PF	500V	-10, +10% SL	C201				1
20		CEAB330ALX		ELYT. CAPACITOR	33MFD	6.3V		C177	C85			2
21		CEAB470ALX		ELYT. CAPACITOR	47MFD	6.3V		C182				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM115BA	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		CEAC101ZMN		ELYT. CAPACITOR	100MFD 10V MS	C112				1
2		CEAC470ACN		ELYT. CAPACITOR		C190				1
3		CEAD100ALX		ELYT. CAPACITOR	10MFD 16V	C115	C170	C80		3
4		CEAD100ZMN		ELYT. CAPACITOR	10MFD 16V MS	C110	C157	C77		3
5		CEAD102ACN		ELYT. CAPACITOR		C186				1
6		CEAD221ZLS		ELYT. CAPACITOR	220MFD 16V SP	C88				1
7		CEAD330ALX		ELYT. CAPACITOR	33MFD 16V	C173	C188			2
8		CEAD470ZMN		ELYT. CAPACITOR	47MFD 16V MS	C87				1
9		CEAE4R7ALX		ELYT. CAPACITOR	4.7MFD 25V	C176	C178	C33		3
10		CEAE4R7ZMN		ELYT. CAPACITOR	4.7MFD 25V MS	C145	C149			2
11		CEAE4R7NON		ELYT. CAPACITOR		C183				1
12		CEAG010ZMN		ELYT. CAPACITOR	1MFD 50V MS	C111	C207			2
13		CKCB222KBM		CERAMIC CAP.	2200PF 50V -10, +10% B	C175	C187			2
14		CKDB102PEM		CERAMIC CAP.	1000PF 50V -0, +100% E	C92	C94			2
15		CKDB103PEM		CERAMIC CAP.	0.01MFD 50V -0, +100% E	C100	C101	C102	C103	45
16						C105	C113	C114	C117	
17						C119	C123	C124	C127	
18						C132	C133	C144	C146	
19						C147	C148	C155	C156	
20						C163	C166	C167	C168	
21						C169	C171	C172	C18	

	PART NAME	PART CODE	
	P.W.BOARD ASSY	AP TBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS				SYMBOLIC				QTY USED
1									C19	C191	C193	C195	
2									C20	C23	C25	C31	
3									C51	C54	C59	C60	
4									C62	C68	C69	C91	
5									C96				
6		CKDB222K8M		CERAMIC CAP.	2200PF	50V	-10, +10%	B	C21				1
7		CKDB472PEM		CERAMIC CAP.	470CPF	50V	-0, +100%	E	C209				1
8		CKDE102PEM		CERAMIC CAP.	1000PF	500V	-0, +100%	E	C208				1
9		CQMB102KEH		MYLAR CAPACITOR	1000PF	50V	-10, +10%		C180				1
10		CQMB103KEH		MYLAR CAPACITOR	0.01MFD	50V	-10, +10%		C109	C179	C181	C192	9
11									C196	C36	C72	C76	
12									C81				
13		CQMB222KEH		MYLAR CAPACITOR	2200PF	50V	-10, +10%		C41	C42	C47	C48	5
14									C79				
15		CQMB223KEH		MYLAR CAPACITOR	0.022MFD	50V	-10, +10%		C44				1
16		CQMB224KEH		MYLAR CAPACITOR	0.22MFD	50V	-10, +10%		C32				1
17		CQMB333KEH		MYLAR CAPACITOR	0.033MFD	50V	-10, +10%		C74				1
18		CQMB472KEH		MYLAR CAPACITOR	4700PF	50V	-10, +10%		C75				1
19		CQMB473KEH		MYLAR CAPACITOR	0.047MFD	50V	-10, +10%		C30	C34	C35	C38	8
20									C39	C40	C43	C46	
21		CSSD3R3MDC		TANTALUM CAP.	3.3MFD	16V	-20, +20%		C27				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				QTY USED
1		CSSER68MDN		TANTALUM CAP.		C45				1
2		CSSE0R1MDN		TANTALUM CAP.	0.1MFD 35V -20, +20%	C184	C185	C78		3
3		CTZA200K01		TRIMMER CAP.		CT15				1
4		CTZ6200H01		TRIMMER CAP.		CT1	CT10	CT11	CT12	13
5						CT13	CT2	CT3	CT4	
6						CT5	CT6	CT7	CT8	
7						CT9				
8		CTZ7200K01		TRIMMER CAP.		CT14				1
9		FBR455F11M		CERAMIC FILTER		FL3				1
10		FF11R7F03A		XTAL FILTER		FL1	FL2			2
11		FZR455A01M		CERAMIC FILTER		FD1				1
12		LA1EE0708A		RF COIL		L13				1
13		LA1GE1002A		RF COIL		L7				1
14		LA1GE1009A		RF COIL		L6				1
15		LA1GG0703A		RF COIL		L21	L22			2
16		LA1GG0704A		RF COIL		L20				1
17		LA1JC1004A		RF COIL		L5				1
18		LA1JE1001A		RF. COIL		L14	L19			2
19		LA5CE1005A		RF COIL		T22				1
20		LDADD3604R		RF COIL		L10				1
21		LDCDA1025F		RF COIL		L8				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC	QTY USED
1		LF100KE02T		CHOKE COIL		L3	1
2		LF220KD01N		FERRITE IND.		L23 L24	2
3		LF220KE01T		PEAKING COIL		L4	1
4		LF563JC02S		RF COIL		L25	1
5		LF681JC01K		RF COIL		L1 L2	2
6		LJ119H004W		CHOKE COIL		CH1	1
7		LL6JR0701A		RF COIL		L18	1
8		LL6JR1502A		RF COIL		L17	1
9		LMBDC1502V		RF COIL		L16	1
10		LNBBC1504S		RF COIL		L9	1
11		LNBBC1504U		RF COIL		L12	1
12		MB222BN001		COIL CASE			2
13		MB332SX001		SHEILD F			1
14		MB654AD001		HEAT SINK			1
15		ML352SX001		SHEILD C			1
16		ML353SX001		SHEILD D			1
17		ML362SX003		SHEILD B			1
18		ML363SX001		SHEILD E			1
19		ML464AD003		HEAT SINK			1
20		MP333SX001		SHEILD G			1
21		MS426AC001		HEAT SINK			1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM115BA	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		MS535SD004		SHIELD RX LD						1
2		MS535SS003		SHEILD F						1
3		MS535SX003		SHEILD J						1
4		MS635SX009		SHEILD A						1
5		MS635SX010		SHEILD H						1
6		MT260AQ001		HEAT SINK						1
7		MT363BD007		X,TAL SUPPORT						1
8		MW201PS001		TERMINAL						27
9		MW401CX004		SHORT JUMPER	JW-5					2
10		MW401CX006		SHOT JAMPER	10MM					7
11		MX326CS001		HEAT SINK						1
12		MX415SS001		CLAMPER						2
13		MZ665AD001		HEAT SINK						1
14		PTBM115E0X		PRINTED W.BOARD						1
15		QDCTT310AQ		VARI-CAP. DIODE	1TT310AQ 12V A-RANK 4PCS-SAME-RANK	D16				1
16		QDG1N60XXT		GERMANIUM DIODE	1N60 NC-RANK	D4	D5	D6	D8	4
17		QDSMA150XN		SILICON DIODE	MA150 VF=1.2V,VR=35V NO-RANK 24MIN	D1	D10	D2	D20	9
18						D21	D22	D3	D7	
19						D9				
20		QDSSR1KX4P		SILICON DIODE	SR1K-4 VR=200 4-RANK 25MIN	D11	D13	D14		3
21		QDZRD36EBA		ZENER DIODE	RD3.6EB 3.4V-3.8V B-RANK	D19				1

	PART NAME	PART CODE	STOCK NO.
	P.W.BOARD ASSY	APT9M1156A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		QDZRD51EXA		ZENER DIODE	RD5.1E 5.1-5.5V NO-RANK	D15				1
2		QDZRD9EXAA		ZENER DIODE	RD9.1E VZ=9.[illegible]-9.87V A-RANK	D17				1
3		QQM0C555BA		I.C.	UPC555H	IC2				1
4		QQMJ0577AA		I.C.	UPC577H	IC1				1
5		QQM00592AA		I.C.	UPC592H2 E,F,H-RANK AF-AMP	IC3				1
6		QQM04558AJ		I.C.	NJM4558D OPERATIONAL AMP.	IC5				1
7		QQM07205BT		I.C.	TA7205AP5.8W AUDIO-POWER-AMP	IC4				1
8		QQOPLL02AN		I.C.	PLL02A(MN6C40)	IC6				1
9		QTB0512XAN		TRANSISTOR	2SB512 P-RANK	Q27				1
10		QTC0710XBE		TRANSISTOR	2SC710 D-RANK	Q13	Q14	Q15	Q16	10
11						Q17	Q19	Q29	Q5	
12						Q6	Q8			
13		QTC0763XCE		TRANSISTOR	2SC763 D-RANK	Q20	Q7			2
14		QTC0900XFA		TRANSISTOR	2SC900 F-RANK	Q9				1
15		QTC0945LAA		TRANSISTOR	2SC945L P,Q-RANK	Q10	Q11	Q18	Q28	5
16						Q4				
17		QTC1674XAA		TRANSISTOR	2SC1674 L-RANK	Q1				1
18		QTC2053XAE		TRANSISTOR	2SC2053 NC-RANK	Q21	Q22			2
19		QTD0313XAC		TRANSISTOR	2SD313 C,D-RANK	Q26				1
20		QTF0237XAM		TRANSISTOR	MRF237 NO-RANK (RF.PWR. 8W.MAX)	Q24				1
21		QTF0238XAM		TRANSISTOR	MRF238 NO-RANK (RF.PWR. 30W.MAX)	Q25				1

PART NAME	PART CODE	
P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				QTY USED
1		QTK0107X4S		TRANSISTOR	2SK107 3,4-RANK	Q12	Q2	Q3		3
2		QTN4427X4M		TRANSISTOR	2N4427 NO-RANK	Q23				1
3		QVESV03XXO		VARISTOR	SV03 NO-RANK (VF:1.60V-2.00V)	D12				1
4		RC14GK272X		FIXED CARBON R.	1/4W 2.7K OHM 10%	R122				1
5		RD25PJ100X		CARBON FILM R.	0.25W 10 OHM 5%	R17	R35			2
6		RD25PJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R21	R43	R44	R5	7
7						R6	R71	R91		
8		RD25PJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R38				1
9		RD25PJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R110	R120	R85		3
10		RD25PJ104X		CARBON FILM R.	0.25W 100K OHM 5%	R23	R24	R87		3
11		RD25PJ120X		CARBON FILM R.	0.25W 12 OHM 5%	R112				1
12		RD25PJ122X		CARBON FILM R.	0.25W 1.2K OHM 5%	R111				1
13		RD25PJ125X		CARBON FILM R.	0.25W 1.2M OHM 5%	R83				1
14		RD25PJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R107	R13	R29	R56	10
15						R57	R62	R64	R66	
16						R73	R76			
17		RD25PJ153X		CARBON FILM R.	0.25W 15K OHM 5%	R26	R8			2
18		RD25PJ154X		CARBON FILM R.	0.25W 150K OHM 5%	R61				1
19		RD25PJ220X		CARBON FILM R.	0.25W 22 OHM 5%	R39	R4			2
20		RD25PJ221X		CARBON FILM R.	0.25W 220 OHM 5%	R105	R3	R33	R55	5
21						R92				

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		RD25PJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R12	R36	R37	R7	4
2		RD25PJ223X		CARBON FILM R.	0.25W 22K OHM 5%	R22	R30	R52		3
3		RD25PJ271X		CARBON FILM R.	0.25W 270 OHM 5%	R42	R47			2
4		RD25PJ272X		CARBON FILM R.	0.25W 2.7K OHM 5%	R89				1
5		RD25PJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R9				1
6		RD25PJ332X		CARBON FILM R.	0.25W 3.3K OHM 5%	R90				1
7		RD25PJ333X		CARBON FILM R.	0.25W 33K OHM 5%	R41	R45			2
8		RD25PJ391X		CARBON FILM R.	0.25W 390 OHM 5%	R94				1
9		RD25PJ392X		CARBON FILM R.	0.25W 3.9K OHM 5%	R46				1
10		RD25PJ393X		CARBON FILM R.	0.25W 39K OHM 5%	R2	R95			2
11		RD25PJ470X		CARBON FILM R.	0.25W 47 OHM 5%	R109				1
12		RD25PJ471X		CARBON FILM R.	0.25W 470 OHM 5%	R74				1
13		RD25PJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R118	R16	R25	R31	6
14						R40	R48			
15		RD25PJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R51				1
16		RD25PJ474X		CARBON FILM R.	0.25W 470K OHM 5%	R28				1
17		RD25PJ562X		CARBON FILM R.	0.25W 5.6K OHM 5%	R18	R19	R20	R53	4
18		RD25PJ563X		CARBON FILM R.	0.25W 56K OHM 5%	R79				1
19		RD25PJ680X		CARBON FILM R.	0.25W 68 OHM 5%	R108				1
20		RD25PJ681X		CARBON FILM R.	0.25W 680 OHM 5%	R54	R80			2
21		RD25PJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R1				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		RD25PJ683X		CARBON FILM R.	0.25W 68K OHM 5%	R88				1
2		RD25PJ823X		CARBON FILM R.	0.25W 82K OHM 5%	R27				1
3		RD25VJ100X		CARBON FILM R.	0.25W 10 OHM 5%	R14				1
4		RD25VJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R100	R101			2
5		RD25VJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R59	R67	R69		3
6		RD25VJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R113	R121	R15	R84	4
7		RD25VJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R97				1
8		RD25VJ153X		CARBON FILM R.	0.25W 15K OHM 5%	R106				1
9		RD25VJ183X		CARBON FILM R.	0.25W 18K OHM 5%	R102	R98			2
10		RD25VJ221X		CARBON FILM R.	0.25W 220 OHM 5%	R75				1
11		RD25VJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R77	R78			2
12		RD25VJ224X		CARBON FILM R.	0.25W 220K OHM 5%	R58	R60	R65	R68	4
13		RD25VJ272X		CARBON FILM R.	0.25W 2.7K OHM 5%	R103				1
14		RD25VJ273X		CARBON FILM R.	0.25W 27K OHM 5%	R82				1
15		RD25VJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R72				1
16		RD25VJ392X		CARBON FILM R.	0.25W 3.9K OHM 5%	R99				1
17		RD25VJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R86				1
18		RD25VJ820X		CARBON FILM R.	0.25W 82 OHM 5%	R104	R32			2
19		RGHANJ680B		M-OXIDE FILM R.	1/2W 68 OHM 5%	R116				1
20		RGHAPJ151B		M-OXIDE FILM R.	1/2W 150 OHM 5%	R114				1
21		RGHAPJ221B		M-OXIDE FILM R.	1/2W 220 OHM 5%	R115				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM11588	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				Q'TY USED
1		RPGNB20201		SEMI-FIXED VR.	2K OHM B-CURVE	RV2				1
2		RPGNB20301		SEMI-FIXED VR.	20K OHM B-CURVE	RV1				1
3		RPGNB50203		SEMI-FIXED VR.	5K OHM B-CURVE	RV3				1
4		RXH1NJ4R7B		M-OXIDE FILM R.	1/2W 4.7 OHM 5%	R93				1
5		RX1ANJ2R7N		M-OXIDE FILM R.	1W 2.7 OHM 5%	R117				1
6		TRA8GZ002M		RF COIL		T1	T2			2
7		TRA8GZ003M		RF COIL		T15				1
8		TR07GZ001M		RF COIL		T6	T7			2
9		TR07GZ007M		RF COIL		T18	T19	T20		3
10		TR07LA004N		I.F.T.		T12				1
11		TR07LA014S		RF COIL		T13	T14			2
12		TR07MN001M		I.F.T.		T10	T11			2
13		TR07NP001M		RF COIL		T16	T17			2
14		TR10GZ011M		RF COIL		T8				1
15		TR10GZ012M		RF COIL		T9				1
16		TR10GZ013M		RF COIL		T21				1
17		TR13GM005S		RF COIL		T3				1
18		TR13GM007S		RF COIL		T4				1
19		TR13GM009S		RF COIL		T5				1
20		VS223RH002		SILICON SHEET						2
21		VS533FX001		BARRIER						1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM1158A	

ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC				QTY USED
1		VT220SX001		TERMINAL						7
2		WD0813Z001		COAXIAL CABLE		14				1
3		WD0815Z005		COAXIAL CABLE		15				1
4		WTG113EEXX		SOLID WIRE		10				1
5		WTG117EEXX		SOLID WIRE		1				1
6		WTG212EEXX		SOLID WIRE		2				1
7		WTG226EEXX		SOLID WIRE		11				1
8		WTG317EEXX		SOLID WIRE		3				1
9		WTG321EEXX		SOLID WIRE		12				1
10		WTG410EEXX		SOLID WIRE		13	4			2
11		WTG509EEXX		SOLID WIRE		5				1
12		WTG610EEXX		SOLID WIRE		6				1
13		WTG710EEXX		SOLID WIRE		7				1
14		WTG821EEXX		SOLID WIRE		8				1
15		WTG919EEXX		SOLID WIRE		9				1
16		XAS1B3009X		XTAL OSCILLATOR		X2				1
17		XAZ1A5002X		XTAL OSCILLATOR	HC-18/U 11.245MHZ	X1				1
18		YFL0000004		FERRITE BEAD						4
19		YSX120002Z		XTAL SOCKET						1
20		ZRA232101Z		RELAY		RY1				1
21										

PART CODE	NOMENCLATURE	SPECIFICATIONS
KKTX120001	CARTON	
KC000023AX	FCC FORM 753	
KL000174XX	CHANNEL NUMBER DECAL	
KTTX1200XX	INSTRUCTION MANUAL	
KZ000042XX	FCC FORM 506	
ACDC089GEA	DC POWER CABLE	IN-LINE FUSED
MU376SM006	MOUNTING BRACKET	
MF284SN004	THUMB (KNURLED) SCREW	FOR MOUNTING BRACKET
VE90JAC003	REPLACEMENT SELECTOR-DIAL	FOR NEW CHANNEL INSTALLATION
ZGAAZ501G0	MICROPHONE	
AMTX120001	ESCUTCHEON ASS'Y	
MU587AD006	CHASSIS	
VB876SX002	CABINET	
VN110SP006	KNOB, 25W/1W	
VN276SP034	KNOB, OFF/VOLUME, SQUELCH	
VN286SP031	KNOB, CHANNEL SELECTOR	
VS755RB003	REAR PANEL GASKET	

COMPREHENSIVE VHF-FM MARINE RADIOTELEPHONE CHANNELS . . . by Designator

OPERATING CHANNEL DESIGNATIONS		FREQUENCY (MHz)		TYPE OF TRAFFIC	FUNCTION	
ORIGINAL	ADDITIONAL	SHIP TX	COAST TX		SHIP/SHIP	SHIP/SHORE
1		156.05	160.65	International Only	–	Yes
2		156.1	160.7	International Only	–	Yes
3		156.15	160.75	International Only	–	Yes
4		156.2	160.8	International Only	–	Yes
5		156.25	160.85	International Only	–	Yes
6		156.3	–	SAFETY	Yes	No
7		156.35	160.95	International Only	–	Yes
7A		156.35	156.35	Commercial	Yes	Yes
8		156.4	–	Commercial	Yes	No
9		156.45	156.45	Commercial	Yes	Yes
9		156.45	156.45	Non-Commercial	Yes	Yes
10		156.5	156.5	Commercial	Yes	Yes
11		156.55	156.55	Commercial	Yes	Yes
12		156.6	156.6	Port Operations, USCG	Yes	Yes
13		156.65	156.65	Locks, Canals, Pilots	Yes	Yes
14		156.7	156.7	Port Operations, USCG	Yes	Yes
15		156.75	156.75	Environ., Hydrographic	Ship Receive Only	Ship Receive Only
16		156.8	156.8	DISTRESS CALLING	Yes	DISTRESS CALL
17		156.85	156.85	State Control Restricted	No	Yes
18		156.9	161.5	International Only	Yes	Yes
18A		156.9	156.9	Commercial	Yes	Yes
19		156.95	161.55	International Only	Yes	Yes
19A		156.95	156.95	Commercial	Yes	Yes
20		157.0	161.6	Port Operations	No	Yes
21		157.05	161.65	International Only	–	Yes
21CG		157.05	157.05	USCG Restricted	Yes	Yes
22		157.1	161.7	International Only	–	Yes
22CG		157.1	157.1	USCG Restricted	Yes	Yes
23		157.15	161.75	International Only	–	Yes
23CG		157.15	157.15	USCG Restricted	Yes	Yes
24		157.2	161.8	Public Corresp.	No	Yes
25		157.25	161.85	Public Corresp.	No	Yes
26		157.3	161.9	Public Corresp.	No	Yes
27		157.35	161.95	Public Corresp.	No	Yes
28		157.4	162.0	Public Corresp.	No	Yes
	60	156.025	160.625	International Only	Ship Receive Only	Ship Receive Only
	61	156.075	160.675	International Only	"	"
	62	156.125	160.725	International Only	"	"
	63	156.175	160.775	International Only	"	"
	64	156.225	160.825	International Only	"	"
	65	156.275	160.875	International Only	Yes	Yes
	65A	156.275	156.275	Port Operations	Yes	Yes
	66	156.325	160.925	International Only	Yes	Yes
	66A	156.325	156.325	Port Operations	Yes	Yes
	67	156.375	–	Commercial	Yes	No
	68	156.425	156.425	Non-Commercial	Yes	Yes
	69	156.475	156.475	Non-Commercial	Yes	Yes
	70	156.525	–	Non-Commercial	Yes	No
	71	156.575	156.575	Non-Commercial	Yes	Yes
	72	156.625	–	Non-Commercial	Yes	No
	73	156.675	156.675	Port Operations	Yes	Yes
	74	156.725	156.725	Port Operations	Yes	Yes
	75	GUARD CHANNEL		–	–	–
	76	GUARD CHANNEL		–	–	–
	77	156.875	–	Commercial	Yes	No
	78	156.925	161.525	International Only	Yes	Yes
	78A	156.925	156.925	Non-Commercial Only	No	Yes
	79	156.975	161.575	International Only	Yes	Yes
	79A	156.975	156.975	Commercial	Yes	Yes
	80	157.025	161.625	International Only	Yes	Yes
	80A	157.025	157.025	Commercial	–	Yes
	81	157.075	161.675	International Only	–	Yes
	82	157.125	161.725	International Only	–	Yes
	83	157.175	161.775	International Only	–	Yes
	83CG	157.175	157.175	USCG Aux. Only	Yes	Yes
	84	157.225	161.825	Public Corresp.	No	Yes
	85	157.275	161.875	Public Corresp.	No	Yes
	86	157.325	161.925	Public Corresp.	No	Yes
	87	157.375	161.975	Public Corresp.	No	Yes
	88	157.425	162.025	International Only	Yes	Yes
	88A	157.425	–	Commercial	Yes	No
WE_1		–	162.55	NOAA Weather	Ship Receive Only	Ship Receive Only
	WE_2	–	162.4	NOAA Weather	"	"
WE_3		–	162.475	"	"	"
	WE_4	–	161.650	"	"	"

Check locally for Channels Authorized or used in your Area.

USA VHF-FM MARINE RADIOTELEPHONE CHANNELS . . . by Function

OPERATING CHANNEL DESIGNATORS		FREQUENCY (MHz)		POINTS OF COMMUNICATION	TYPE OF TRAFFIC
ORIGINAL	ADDITIONAL	SHIP TX	COST TX		
DISTRESS, SAFETY AND CALLING					
16		156.8	156.8	Ship/Ship, Ship/Shore	DISTRESS CALLING
INTERSHIP SAFETY					
6		156.3	156.3	Ship/Ship	SAFETY
NAVIGATIONAL BRIDGE TO BRIDGE					
13		156.65	156.65	Ship/Ship, Ship/Shore	Locks, Canals, Pilots, Bridges
ENVIRONMENTAL					
15			156.75	Shore to Ship, Rev Only	Environ., Hydrographic
STATE CONTROL					
17		156.85	156.85	Ship/Shore	RESTRICTED
PORT OPERATIONS					
12		156.6	156.6	Ship/Ship, Ship/Shore	USCG
14		156.7	156.7	"	USCG, Port Auth.
20		157.0	161.6	Ship/Shore Only	Port Operations, USA
	65A	156.275	156.275	Ship/Ship, Ship/Shore	"
	66A	156.326	156.325	"	"
	73	156.675	156.675	"	"
	74	156.725	156.725	"	"
COMMERCIAL					
7A		156.35	156.35	Ship/Ship, Ship/Shore	Commercial, USA
8		156.4		Ship/Ship Only	"
9		156.45	156.45	Ship/Ship, Ship/Shore	"
10		156.5	156.5	"	"
11		156.55	156.55	"	"
18A		156.9	156.9	"	"
19A		156.95	156.95	"	"
	67	156.375	–	Ship/Ship Only	Work boats
	77	156.875		"	Commercial, USA
	79A	156.975	156.975	Ship/Ship, Ship/Shore	"
	80A	157.025	157.025	"	"
	88A	157.425	–	Ship/Ship Only	Fishing Vessels
NON-COMMERCIAL					
9		156.45	156.45	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	68	156.425	156.425	Ship/Ship, Ship/Shore	Yachts
	69	156.475	156.475	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	70	156.525		Ship/Ship Only	Yachts
	71	156.575	156.575	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	72	156.625		Ship/Ship Only	Yachts
	78A	156.925	156.925	Ship/Shore Only	Clubs, Marinas, Yards, etc.
	83CG	157.175	157.175	Ship/Ship, Ship/Shore	USCG Aux. Only
PUBLIC CORRESPONDENCE					
24		157.2	161.8	Ship/Public Coast	Telephone Corresp.
25		157.25	161.85	"	"
26		157.3	161.9	"	"
27		157.35	161.95	"	"
28		157.4	162.0	"	"
	84	157.225	161.825	"	"
	85	157.275	161.875	"	"
	86	157.325	161.925	"	"
	87	157.375	161.975	"	"
NOAA WEATHER SERVICE					
WE_1		–	162.55	Ship Receive Only	Weather Broadcasts
	WE_2		162.4	"	"
WE_3			162.475	Ship Receive Only	Weather Broadcasts
	WE_4	–	162.650	"	"

Check locally for Channels Authorized or used in your Area.

CTX 1078

78 CHANNEL VHF MARINE HAND HELD RADIO TELEPHONE

- Fully Synthesized to Operate on all U.S.A. and International Channels.
- Convenient Thumb Wheel Channel Selector.
- Instant Emergency Channel 16 Selection.
- Convenient Hi-Lo Transmit Power Selector.
- Powered by Rechargeable Ni-Cad Battery Pack.
- Compact Durable Weather Resistant Design.

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Important.
In compliance with certain state laws, Cybernet International Inc., the manufacturer of the equipment you have purchased, is required to provide suitable space in your operation manual to enable you to record the model and serial numbers on the equipment and to provide you with a description of the location of such numbers on the equipment. When you have entered the required information in the spaces provided below, you should retain the manual so that you have a permanent record of these model and serial numbers.

Unit description: Hand-held VHF/FM marine transceiver

Model number (located on rear of unit):
Cybernet CTX 1078

Serial number (located on rear of unit):

General Description

The CTX 1078 is a microcomputer controlled, all solid state compact hand-held FM radiotelephone providing all US and international transmit and receive channels in the VHF FM marine band as assigned by the International Telecommunications Union. The radiotelephone employs the most advanced PLL frequency synthesizer system which enables you to select any channels in both US and international marine channels without needing to add any crystals since all channels are already provided by the frequency synthesizer.
The radiotelephone is designed for hand-held use on commercial or pleasure boats and will provide years of reliable service with ordinary care since protection against environmental condition has been provided by use of carefully selected parts and rust-proof, corrosion-resistant materials where necessary. However, always protect the unit against water splash.
The radiotelephone features adjustable squelch control which can be used to silence the receiver when no signals are being received, HI-LO transmitting power switch, USA-INT band selection switch and connectors for external speaker/ microphone which allow to ensure the ease of operation.
Although the radiotelephone is designed to operate with 9.6V DC battery power pack provided inside the unit, an external power supply can also supply power to the unit through the PWR jack provided at the bottom of the cabinet.

Important.
Before operating the radiotelephone, you must obtain your license. It is illegal to transmit without an appropriate license which can be obtained by submitting completed FCC Form 506 and Form 753 to the FCC.
Furthermore you are required to understand Part 83 of the FCC Rules and Regulations prior to operation of your radiotelephone. It is the user's responsibility to see that this unit is operating at all times in accordance with the FCC Rules and Regulations.
(FCC Forms 506 and 753 are packed with your unit.)

Battery Pack Installation

The battery pack, supplied as a standard accessory, is fully charged when it leaves the factory. However, it should be recharged for about three hours or more before use, since it may partly discharged during shipping.

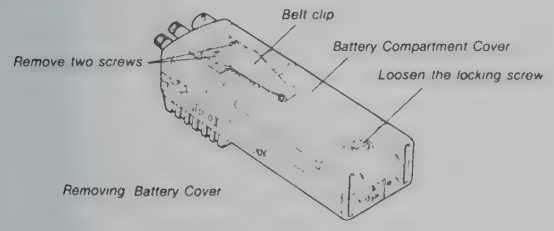
Installation.

1 The battery compartment is located on the rear of the unit. To remove the compartment cover, first remove two screws securing the belt hook on the rear of the cabinet. Then loosen the locking screw on the cover using a coin or similar instrument.

2 Check the POWER switch is OFF.

3 Connect the 4-pin female battery power connector to the matching male connector provided on the bottom side of the compartment. Do not attempt to force the connector onto the pin, it will slip on easily when it is properly aligned.

4 Insert the battery pack into the compartment and reassemble the cover and the belt clip, using the reverse procedure.



Removing Battery Cover

About Ni-Cad batteries.

1 Charging current. The battery pack used in your radiotelephone can handle a large charging current of 200 mA. It is not recommended that you use a battery pack other than the one designed for the radiotelephone. However, if replacement becomes necessary for emergency reasones, be sure to check the charging current of the battery to be used. The battery should have 500 mAH capacity at 9.6V.

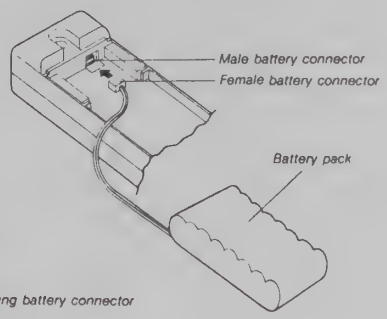
2 Continuous charging. The battery can be fully charged in 5–6 hours. If another battery must be used, be sure to note its charging time and its maximum charging current shall be less than 200 mA.

3 Charging temperature. We recommend that charging the Ni-Cad battery be made within the range of +10°C to +50°C (+50°F to +95°F). It will not be possible to charge the Ni-Cad battery at the temperature lower than 0°C (+32°F) or higher than +45°C (+113°F).

4 Over-discharging. Attempting to run the battery after it is discharged completely may reduce the battery life or cause the fluid content to leak out. If the battery is not to be used for a long period of time, remove it from the radiotelephone to avoid possible damage to the radiotelephone from leaked fluid.

Battery Pack charging.

The operational characteristics of the Ni-Cad batteries used in the battery power pack under loaded conditions are different from those of conventional non-rechargeable batteries and experience rapid voltage drop when they discharge almost completely. Therefore, it is very difficult to determine when the battery pack requires recharging. It is therefore recommended to recharge the battery pack for a few hours each time after use of your radiotelephone, or observe the TX/BATT indicator while you are transmitting and if the indicator lights up dimly, then immediately charge the battery pack. To charge the battery pack, use Cybernet optional battery charger and connect it to the CHG jack on the unit (see page ⑤ item 15). Do not use any other kinds of charging devices.



Connecting battery connector

5 Life expectancy. The battery should last for more than 300 charging cycles when correctly used.

6 Special precautions.

a) Be sure to use only the charger unit which will be supplied as a standard optional accessory for the radiotelephone.

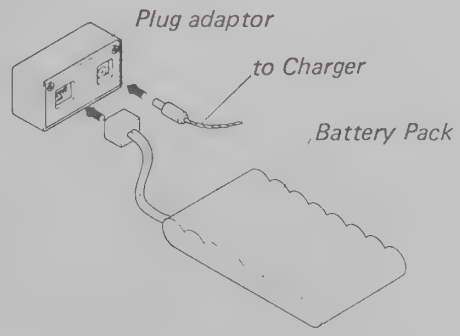
b) Observe correct polarity for charging.

c) Do not solder directly to the battery

d) Do not dispose of the battery in fire.

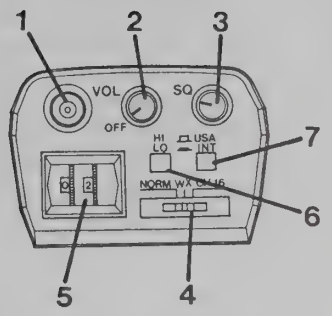
e) Do not connect the charger to the PWR jack and use as an external operating power source (Unit will not transmit properly).

7 When an optional battery pack is purchased a plug conversion adaptor is supplied together. Use the adaptor to recharge the battery pack discretely as follows:



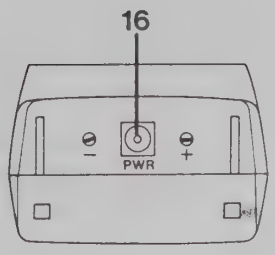
Operating Controls and Features

1 Antenna connector.
A BNC type which accepts the rubber helical antenna supplied with the unit as the standard accessory. Do not use any other antenna since improper impedance matching may cause reduction in effective communication range, spurious radiation increment, and excessive battery drain.

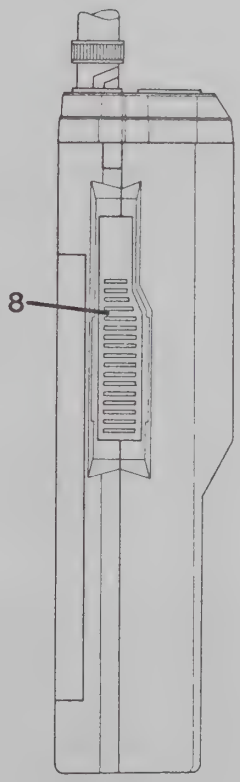


2 OFF/VOL control.
Set this control to fully counterclockwise position to turn off the unit. Rotate clockwise to turn power on. Rotate further to increase the loudness of the sound from the speaker.

3 SQ (squelch) control.
Used to eliminate annoying background noise when no signal is present. To adjust the squelch properly during reception, first turn the control counterclockwise until background noise is heard. Then rotate the control slowly clockwise until background noise just disappears. At this point, the receiver will be relatively quiet under no signal condition but an incoming signal will overcome the squelch action and be heard. Since this control is variable it can be used to provide varying degrees of sensitivity to incoming signals. As the control is advanced from the extreme counterclockwise position, the squelch action is progressively increased and stronger signals are needed to overcome it. To receive extermely weak signals or to disable the squelch circuit simply turn the control fully counterclockwise.

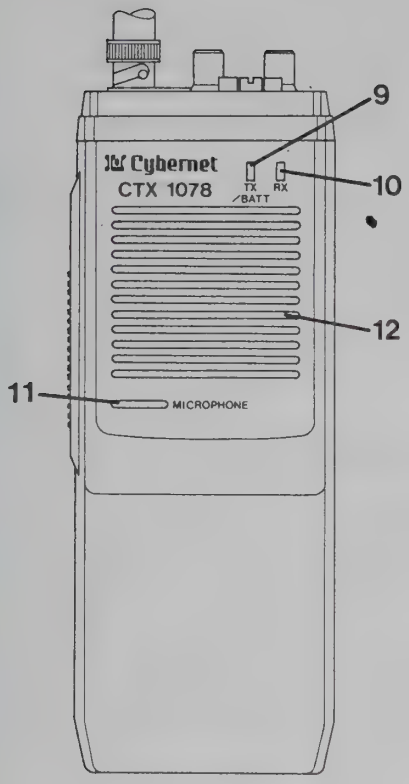


4 NORM-WX-CH16 switch.
Introduces the following channel selection:
NORM. Any one of the channels listed in the **Channels and Frequencies Provided** (page ⑦) can be selected by the channel selector.
WX. Allows you to monitor weather broadcasts.
CH16. Automatically switches the unit to channel 16 (distress and calling channel) regardless of the actual setting of the channel selector.



5 Channel selector.
The channel selector consists of two BCD (binary code) switches which generates channel selection codes. To select a channel, turn these switches until the desired channel number is indicated. Although the channel selector can be set to any sequence of numbers between 00 and 99, the radiotelephone will inhibit the generation of illegal channel frequencies other than those contained in the **Channels and Frequencies Proviced** (page ⑦).

6 HI-LO RF power switch (see page ⑥).
This switch selects either 3W or 1W transmitting



power. Set this switch to released position so that the radiotelephone produces the full rated transmitting power (3W). Depress this switch to reduce the transmitting power to 1W for local communications. It is suggested that the initial contact be made with this switch released and then switched to LO (depressed) to continue the communication. This is possible when the signal must travel only short distances. Switching to LO will cause less interference to the other station using the same frequency and provides less battery drainage for long operation period.

7 USA-INT selector switch.
This switch selects either USA or international channels. Set to released position when making communicating on USA channels or depress (to INT) when using international channels.

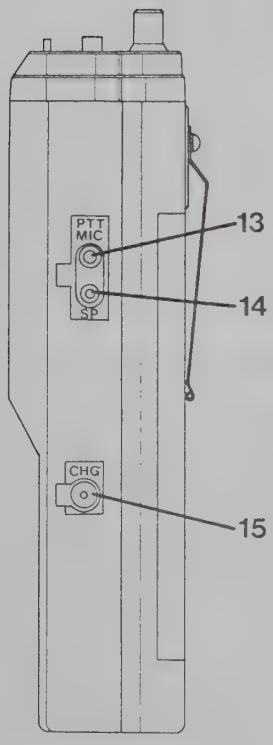
8 Push-to-talk (transmit) switch.
Depress to transmit; release to receive.

9 TX/BATT indicator.
Lights up during transmitting. This indicator also indicates the state of the battery discharge condition. Observe the brightness of the indicator. If this lights up only dimly or does not light during transmitting, immediately recharge the battery.

10 RX indicator.
Lights up when signals are being received.

11 Microphone.

12 Speaker.



13 External MIC jack.
Accepts the plug from an external microphone. The external microphone/speaker for the radiotelephone will be available from your Cybernet dealer.

14 External SP jack.
Accepts the plug from an external speaker. The external microphone/speaker is available from your Cybernet dealer.

15 CHG (Charge) jack.
This accepts the battery charger for recharging the Ni-Cad battery pack installed in the radiotelephone.

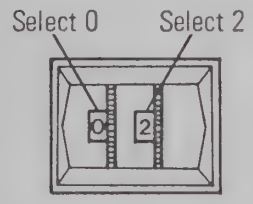
16 PWR (Power) jack.
This jack accepts an appropriate plug from an external power source of 9.6V (0.9A or more) when operating the radiotelephone from such a power supply. The center pin terminal is grounded and the outer terminal is connected to +9.6V power line. Connecting the external power source to this jack automatically disconnects the installed battery with-in the battery compartment.

Operating Procedures

Important!
Do not attempt to transmit without an antenna connected or an improper antenna connected. This may have a damaging effect to the RF power transistors in the radiotelephone.

To monitor weather broadcasts
The United States Weather Bureau and other countries broadcast official and disaster warnings from certain locations on various frequencies. This radiotelephone is capable of receiving these transmissions on four channels as listed in **Channels and Frequencies Provided** (page ⑦).

To listen to weather broadcasts:
1 Connect the rubber antenna supplied to the BNC antenna connector.
2 Turn the unit on and turn the VOLUME control until background noise is heard. Be sure to turn the SQ control to its fullest counterclockwise position initially.
3 Set the NORM-WX-CH16 switch to WX.
4 Set the channel selector to one of the weather channel numbers – i.e. 01, 02, 03, or 04.
e.g. To select weather channel 02:



Transmit and receive operation
Before operating the radiotelephone transmitter, you must meet all requirements as set up by the local government agency in charge of communications in your country. In most countries this includes obtaining a proper license and having access to the rules and regulations covering this type of equipment.

1 Connect the rubber antenna supplied to the antenna connector.
2 Turn the unit on and turn the VOLUME control until background noise is heard. Be sure to turn the SQ control to its fullest counterclockwise position initially.
3 Set the NORM-WX-CH16 switch to NORM.
4 Set the USA-INT switch to either USA or INT depending on the channel you desire to operate the radiotelephone.
5 Adjust the channel selector to the channel on which you want to operate.
6 Set the HI-LO power switch to HI initially. You may set this switch to LO after the communication is established provided it allows proper communication.

7 To transmit, depress the push-to-talk switch and speak slowly and clearly in your normal voice with the microphone about two inches from your mouth. The TX indicator should now light indicating that the transmitter is operating.
8 To receive, simply release the push-to-talk switch.

Operating notes.
a – During periods of transmission, the receiver is silenced and reception is therefore impossible. For the same reason, your signal can not be heard by another station when they are in the transmitting mode.
b – When using channel 16 (for distress and calling) simply set the NORM-WX-CH16 switch to CH16. This allows the radiotelephone to immediately select channel 16 regardless of the actual setting of the channel selector.
c – To avoid any possible interference against the important emergency channel assigned as channel 16 for distress, safety and calling, the transmit power of your radiotelephone is reduced to 1W automatically when you set the channel selector to either channel 15 or channel 17 regardless of the actual HI-LO switch setting.

Proper radio communication procedure.
a – Do not shout into the microphone. Always speak in a normal tone with your mouth about two inches away from the microphone.
b – Do not use the radiotelephone except for meaningful communications. Keep transmissions as short as possible.
c – Listen to a channel before transmitting on it. You may be interrupting important communications.
d – Always identify your boat by giving its call sign and name at the beginning and end of each message.
e – Keep a log book of all distress, emergency, navigation, and safety type of information. Note the date, time, call letters and names of all ships involved and the content of the message. The log book should be signed by the person making entries.
f – It is against the law to use profane or obscene comments on the radio. Remember you are in effect transmitting on party line.

Note: During transmitting in LO power mode, the TX/BATT indicator lights up with its brightness almost half the normal brightness at full rated RF power, indicating that the unit is transmitting in LO power mode.

Specifications

Receiver

Frequency range
156.00 – 163.00 MHz
Channels provided
Refer to the chart in this page.
Sensitivity
0.3 microvolt 12 dB SINAD
0.35 microvolt 20 dB NQ
Acceptance bandwidth
±7 kHz
Hum and noise
40 dB at 1 mW RF input
Spurious rejection
60 dB
Image rejection
40 dB
Intermodulation rejection
50 dB
Adjacent channel rejection
60 dB
Squelch sensitivity
threshold 0.2 microvolt
tight 0.4 to 1 microvolt
Audio power output
0.2W into 8 Ohm at 10% distortion

Transmitter

Frequency range
156.00 – 157.5 MHz
Channels provided
Refer to the chart in this page.
RF power output
3W/1W selectable
Modulation
16F3
Deviation
±5 kHz
Frequency stability
±0.001%
Hum and noise
40 dB
Spurious and harmonic emission
60 dB
Microphone sensitivity
3 mV at 70% modulation
Microphone
Electret type

General

Operating temperature range
−20°C to +50°C
Power source
Rechargeable Ni-Cad battery 9.6V DC
Power consumption
transmit 1.0A
receive 0.2A
receive stand by 40 mA
Battery life
2.5 hours with the duty cycle of
5 minutes receiving and 1 minute
transmitting at 25°C.
Applicable rules
FCC Part 83 and Part 15, subpart C.
DOC RSS 182

Channels and Frequencies Provided

CHANNEL DESIG.	TRANSMITTER	RECEIVER POSITION OF USA/INT'L BUTTON	
		USA	INT'L
1	156.050 (MHz)	156.050 (MHz)	160.650 (MHz)
2	156.100 (MHz)	156.100 (MHz)	160.700 (MHz)
3	156.150 (MHz)	156.150 (MHz)	160.750 (MHz)
4	156.200 (MHz)	156.200 (MHz)	160.800 (MHz)
5	156.250 (MHz)	156.250 (MHz)	160.850 (MHz)
6	156.300 (MHz)	156.300 (MHz)	156.300 (MHz)
7	156.350 (MHz)	156.350 (MHz)	160.950 (MHz)
8	156.400 (MHz)	156.400 (MHz)	156.400 (MHz)
9	156.450 (MHz)	156.450 (MHz)	156.450 (MHz)
10	156.500 (MHz)	156.500 (MHz)	156.500 (MHz)
11	156.550 (MHz)	156.550 (MHz)	156.550 (MHz)
12	156.600 (MHz)	156.600 (MHz)	156.600 (MHz)
13	156.650 (MHz)	156.650 (MHz)	156.650 (MHz)
14	156.700 (MHz)	156.700 (MHz)	156.700 (MHz)
15	156.750 (MHz)*	156.750 (MHz)	156.750 (MHz)
16	156.800 (MHz)	156.800 (MHz)	156.800 (MHz)
17	156.850 (MHz)	156.850 (MHz)	156.850 (MHz)
18	156.900 (MHz)	156.900 (MHz)	161.500 (MHz)
19	156.950 (MHz)	156.950 (MHz)	161.550 (MHz)
20	157.000 (MHz)	157.000 (MHz)	161.600 (MHz)
21	157.050 (MHz)	157.050 (MHz)	161.650 (MHz)
22	157.100 (MHz)	157.100 (MHz)	161.700 (MHz)
23	157.150 (MHz)	157.150 (MHz)	161.750 (MHz)
24	157.200 (MHz)	161.800 (MHz)	161.800 (MHz)
25	157.250 (MHz)	161.850 (MHz)	161.850 (MHz)
26	157.300 (MHz)	161.900 (MHz)	161.900 (MHz)
27	157.350 (MHz)	161.950 (MHz)	161.950 (MHz)
28	157.400 (MHz)	162.000 (MHz)	162.000 (MHz)
60	156.025 (MHz)	156.025 (MHz)	160.625 (MHz)
61	156.075 (MHz)	156.075 (MHz)	160.675 (MHz)
62	156.125 (MHz)	156.125 (MHz)	160.725 (MHz)
63	156.175 (MHz)	156.175 (MHz)	160.775 (MHz)
64	156.225 (MHz)	156.225 (MHz)	160.825 (MHz)
65	156.275 (MHz)	156.275 (MHz)	160.875 (MHz)
66	156.325 (MHz)	156.325 (MHz)	160.925 (MHz)
67	156.375 (MHz)	156.375 (MHz)	156.375 (MHz)
68	156.425 (MHz)	156.425 (MHz)	156.425 (MHz)
69	156.475 (MHz)	156.475 (MHz)	156.475 (MHz)
70	156.525 (MHz)	156.525 (MHz)	156.525 (MHz)
71	156.575 (MHz)	156.575 (MHz)	156.575 (MHz)
72	156.625 (MHz)	156.625 (MHz)	156.625 (MHz)
73	156.675 (MHz)	156.675 (MHz)	156.675 (MHz)
74	156.725 (MHz)	156.725 (MHz)	156.725 (MHz)
77	156.875 (MHz)	156.875 (MHz)	156.875 (MHz)
78	156.925 (MHz)	156.925 (MHz)	161.525 (MHz)
79	156.975 (MHz)	156.975 (MHz)	161.575 (MHz)
80	157.025 (MHz)	157.025 (MHz)	161.625 (MHz)
81	157.075 (MHz)	157.075 (MHz)	161.675 (MHz)
82	157.125 (MHz)	157.125 (MHz)	161.725 (MHz)
83	157.175 (MHz)	157.175 (MHz)	161.775 (MHz)
84	157.225 (MHz)	161.825 (MHz)	161.825 (MHz)
85	157.275 (MHz)	161.875 (MHz)	161.875 (MHz)
86	157.325 (MHz)	161.925 (MHz)	161.925 (MHz)
87	157.375 (MHz)	161.975 (MHz)	161.975 (MHz)
88	157.425 (MHz)	157.425 (MHz)	162.025 (MHz)

*Channel 15: The unit will not transmit on this channel for USA band

Weather Channels Provided	
CHANNEL 01 (162.550 MHz) NOAA	Weather (Weather SW On) RECEIVE ONLY
CHANNEL 02 (162.400 MHz) NOAA	Weather (Weather SW On) RECEIVE ONLY
CHANNEL 03 (162.475 MHz) NOAA	Weather (Weather SW On) RECEIVE ONLY
CHANNEL 04 (161.650 MHz) CANADA	Weather (Weather SW On) RECEIVE ONLY

Comprehensive VHF-FM Marine Radiotelephone Channels

by Designator

OPERATING CHANNEL DESIGNATIONS		FREQUENCY (MHz)		TYPE OF TRAFFIC	FUNCTION	
ORIGINAL	ADDITIONAL	SHIP TX	COST TX		SHIP SHIP	SHIP SHORE
1		156.05	160.65	International Only		Yes
2		156.1	160.7	International Only		Yes
3		156.15	160.75	International Only		Yes
4		156.2	160.8	International Only		Yes
5		156.25	160.85	International Only		Yes
6		156.3		SAFETY	Yes	No
7		156.35	160.95	International Only	–	Yes
7A		156.35	156.35	Commercial	Yes	Yes
8		156.4	–	Commercial	Yes	No
9		156.45	156.45	Commercial	Yes	Yes
9		156.45	156.45	Non-Commercial	Yes	Yes
10		156.5	156.5	Commercial	Yes	Yes
11		156.55	156.55	Commercial	Yes	Yes
12		156.6	156.6	Port Operations, USCG	Yes	Yes
13		156.65	156.65	Locks, Canals, Pilots	Yes	Yes
14		156.7	156.7	Port Operations, USCG	Yes	Yes
15		156.75	156.75	Environ., Hydrographic	Ship Receive Only	Ship Receive Only
16		156.8	156.8	DISTRESS CALLING	Yes	DISTRESS CALL
17		156.85	156.85	State Control Restricted	No	Yes
18		156.9	161.5	International Only	Yes	Yes
18A		156.9	156.9	Commercial	Yes	Yes
19		156.95	161.55	International Only	Yes	Yes
19A		156.95	156.95	Commercial	Yes	Yes
20		157.0	161.6	Port Operations	No	Yes
21		157.05	161.65	International Only	–	Yes
21CG		157.05	157.05	USCG Restricted	Yes	Yes
22		157.1	161.7	International Only	–	Yes
22CG		157.1	157.1	USCG Restricted	Yes	Yes
23		157.15	161.75	International Only	–	Yes
23CG		157.15	157.15	USCG Restricted	Yes	Yes
24		157.2	161.8	Public Corresp.	No	Yes
25		157.25	161.85	Public Corresp.	No	Yes
26		157.3	161.9	Public Corresp.	No	Yes
27		157.35	161.95	Public Corresp.	No	Yes
28		157.4	162.0	Public Corresp.	No	Yes
	60	156.025	160.625	International Only	Ship Receive Only	Ship Receive Only
	61	156.075	160.675	International Only	"	"
	62	156.125	160.725	International Only	"	"
	63	156.175	160.775	International Only	"	"
	64	156.225	160.825	International Only	"	"
	65	156.275	160.875	International Only	Yes	Yes
	65A	156.275	156.275	Port Operations	Yes	Yes
	66	156.325	160.925	International Only	Yes	Yes
	66A	156.325	156.325	Port Operations	Yes	Yes
	67	156.375	–	Commercial	Yes	No
	68	156.425	156.425	Non-Commercial	Yes	Yes
	69	156.475	156.475	Non-Commercial	Yes	Yes
	70	156.525	–	Non-Commercial	Yes	No
	71	156.575	156.575	Non-Commercial	Yes	Yes
	72	156.625	–	Non-Commercial	Yes	No
	73	156.675	156.675	Port Operations	Yes	Yes
	74	156.725	156.725	Port Operations	Yes	Yes
	75	GUARD CHANNEL		–	–	–
	76	GUARD CHANNEL		–	–	–
	77	156.875	–	Commercial	Yes	No
	78	156.925	161.525	International Only	Yes	Yes
	78A	156.925	156.925	Non-Commercial Only	No	Yes
	79	156.975	161.575	International Only	Yes	Yes
	79A	156.975	156.975	Commercial	Yes	Yes
	80	157.025	161.625	International Only	Yes	Yes
	80A	157.025	157.025	Commercial	–	Yes
	81	157.075	161.675	International Only		Yes
	82	157.125	161.725	International Only		Yes
	83	157.175	161.775	International Only		Yes
	83CG	157.175	157.175	USCG Aux. Only	Yes	Yes
	84	157.225	161.825	Public Corresp.	No	Yes
	85	157.275	161.875	Public Corresp	No	Yes
	86	157.325	161.925	Public Corresp.	No	Yes
	87	157.375	161.975	Public Corresp	No	Yes
	88	157.425	162.025	International Only	Yes	Yes
	88A	157.425		Commercial	Yes	No
WE_1		–	162.55	NOAA Weather	Ship Receive Only	Ship Receive Only
	WE_2	–	162.4	NOAA Weather	"	"
WE_3		–	162.475	"	"	"
	WE_4	–	161.650	"	"	"

Check locally for Channels Authorized or used in your Area

by Function

OPERATING CHANNEL DESIGNATORS		FREQUENCY (MHz)		POINTS OF COMMUNICATION	TYPE OF TRAFFIC
ORIGINAL	ADDITIONAL	SHIP TX	COST TX		
DISTRESS, SAFETY AND CALLING					
16		156.8	156.8	Ship/Ship, Ship/Shore	DISTRESS CALLING
INTERSHIP SAFETY					
6		156.3	156.3	Ship/Ship	SAFETY
NAVIGATIONAL BRIDGE TO BRIDGE					
13		156.65	156.65	Ship/Ship, Ship/Shore	Locks, Canals, Pilots, Bridges
ENVIRONMENTAL					
15			156.75	Shore to Ship, Rev Only	Environ., Hydrographic
STATE CONTROL					
17		156.85	156.85	Ship/Shore	RESTRICTED
PORT OPERATIONS					
12		156.6	156.6	Ship/Ship, Ship/Shore	USCG
14		156.7	156.7	"	USCG, Port Auth.
20		157.0	161.6	Ship/Shore Only	Port Operations, USA
	65A	156.275	156.275	Ship/Ship, Ship/Shore	"
	66A	156.325	156.325	"	"
	73	156.675	156.675	"	"
	74	156.725	156.725	"	"
COMMERCIAL					
7A		156.35	156.35	Ship/Ship, Ship/Shore	Commercial, USA
8		156.4		Ship/Ship Only	"
9		156.45	156.45	Ship/Ship, Ship/Shore	"
10		156.5	156.5	"	"
11		156.55	156.55	"	"
18A		156.9	156.9	"	"
19A		156.95	156.95	"	"
	67	156.375	–	Ship/Ship Only	Work boats
	77	156.875	–	"	Commercial, USA
	79A	156.975	156.975	Ship/Ship, Ship/Shore	"
	80A	157.025	157.025	"	"
	88A	157.425	–	Ship/Ship Only	Fishing Vessels
NON-COMMERCIAL					
9		156.45	156.45	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	68	156.425	156.425	Ship/Ship, Ship/Shore	Yachts
	69	156.475	156.475	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	70	156.525	–	Ship/Ship Only	Yachts
	71	156.575	156.575	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	72	156.625	–	Ship/Ship Only	Yachts
	78A	156.925	156.925	Ship/Shore Only	Clubs, Marinas, Yards, etc.
	83CG	157.175	157.175	Ship/Ship, Ship/Shore	USCG Aux. Only
PUBLIC CORRESPONDENCE					
24		157.2	161.8	Ship/Public Coast	Telephone Corresp.
25		157.25	161.85	"	"
26		157.3	161.9	"	"
27		157.35	161.95	"	"
28		157.4	162.0	"	"
	84	157.225	161.825	"	"
	85	157.275	161.875	"	"
	86	157.325	161.925	"	"
	87	157.375	161.975	"	"
NOAA WEATHER SERVICE					
WE_1		–	162.55	Ship Receive Only	Weather Broadcasts
	WE_2	–	162.4	"	"
WE_3		–	162.475	Ship Receive Only	Weather Broadcasts
	WE_4	–	162.650	"	"

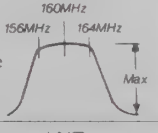
Check locally for Channels Authorized or used in your Area

Alignment Procedure

Important.
The FCC requires that any adjustment of the frequency of a radiotelephone must be performed by an authorized person, the holder of a current First or Second Class Radiotelephone License.
The CTX 1078 has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the unit may be aligned as indicated below. It is recommended that you do not try to adjust any circuit in this radiotelephone unless you entirely understand circuit operation and have enough knowledge and experience in this field of marine radiotelephones. Since the radiotelephone is most precise and sophisticated tempering with the unit may cause upsetting the alignment and lower the performance.

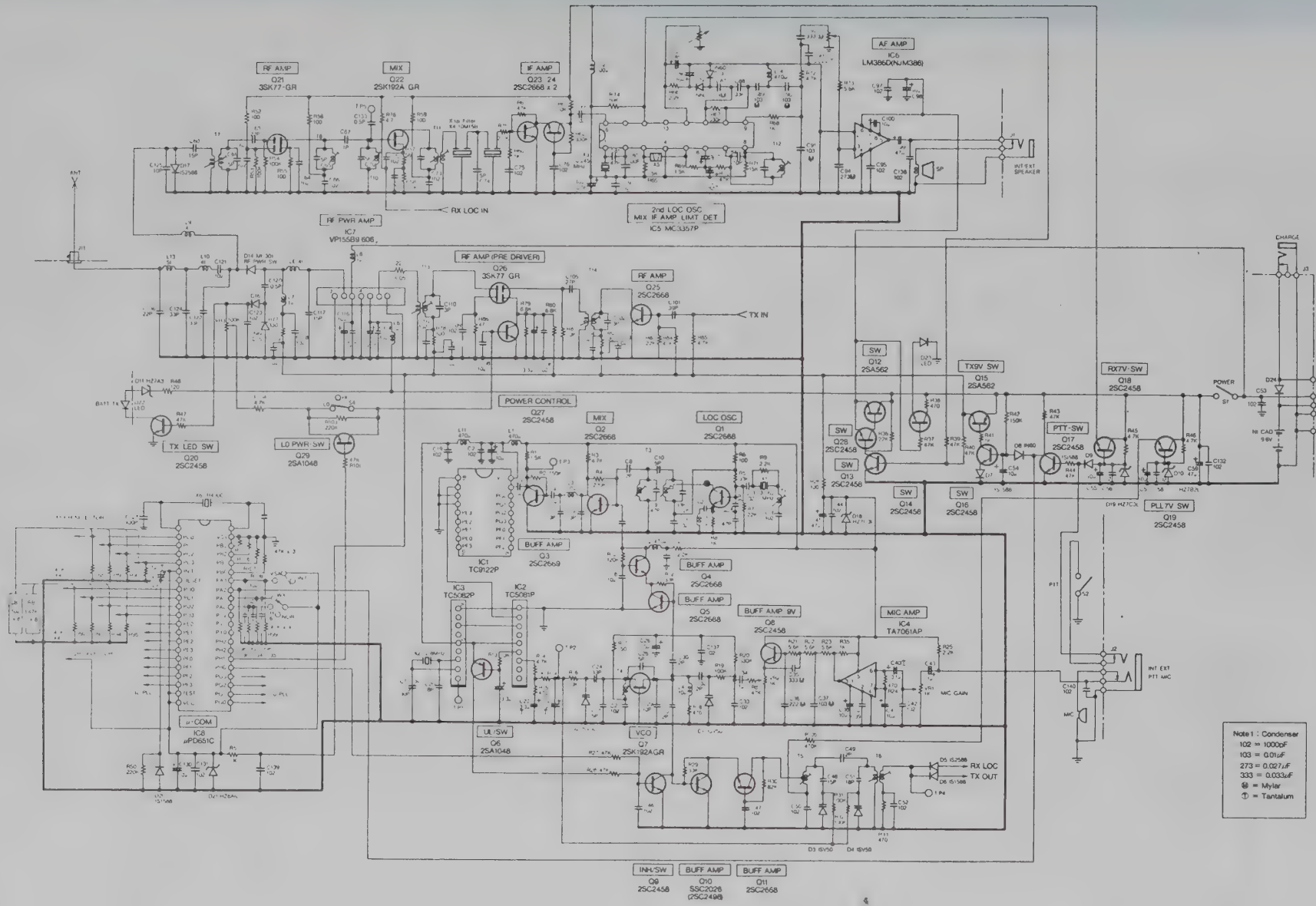
Test equipment recommended.
Following test equipment are recommended for the alignment:

1 Regulated dc power supply, 0–12V, 1A or higher.
2 Audio signal generator, 10–20,000 Hz.
3 dc voltmeter or digital voltmeter.
4 Frequency counter, 0–250 MHz, high input-Z.
5 Deviation meter.
6 Oscilloscope.
7 RF power meter, 5W.
8 Standard signal generator.
9 Tracking generator.
10 Distortion analyzer.
11 Audio level meter.
12 T-coupling distributor.
13 Drivers, etc.

STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	CT1 Reference Oscillator	TP1	1. Set channel selector to channel "06" (156.300 MHz) 2. Connect frequency counter to TP1 and chassis ground. 3. Adjust CT1 until the frequency counter indicates 12.80000MHz +500Hz
2	T4 VCO Voltage	TP2	1. Set channel selector to channel "06" 2. Connect DC voltmeter to TP2 and chassis ground. 3. Adjust T4 to obtain DC voltage reading of 2V ±0.2V
3	T2, T3, T4, T5, T6 Local Oscillator	TP3 TP4 (D5,6)	1. Set channel selector to channel "06" 2. Connect oscilloscope to TP3 and frequency counter to TP4. 3. Adjust T2 and T3 for minimum amplitude on scope display. 4. Adjust T4 to obtain frequency reading of 145.600MHz ±200Hz. 5. Adjust T5 and T6 for maximum amplitude on scope display.
4	T7, T8, T10 Receiver RF Circuit	TP5	1. Connect tracking generator to ANT connector and oscilloscope to TP5. 2. Adjust T7, T8, and T10 alternately until frequency response as shown is obtained. 
5	T11 T12 Receiver IF Circuit	SP Jack	1. Connect signal generator to ANT connector and adjust it to provide 156.300MHz (CH06) 1kHz, 1mV (3kHz deviation) antenna input. 2. Connect distortion analyzer and oscilloscope to 8Ω dummy load connected across the speaker output circuit. 3. Set the channel selector to channel "06". 4. Adjust T11 and T12 alternately to obtain lowest distortion and maximum audio output power.

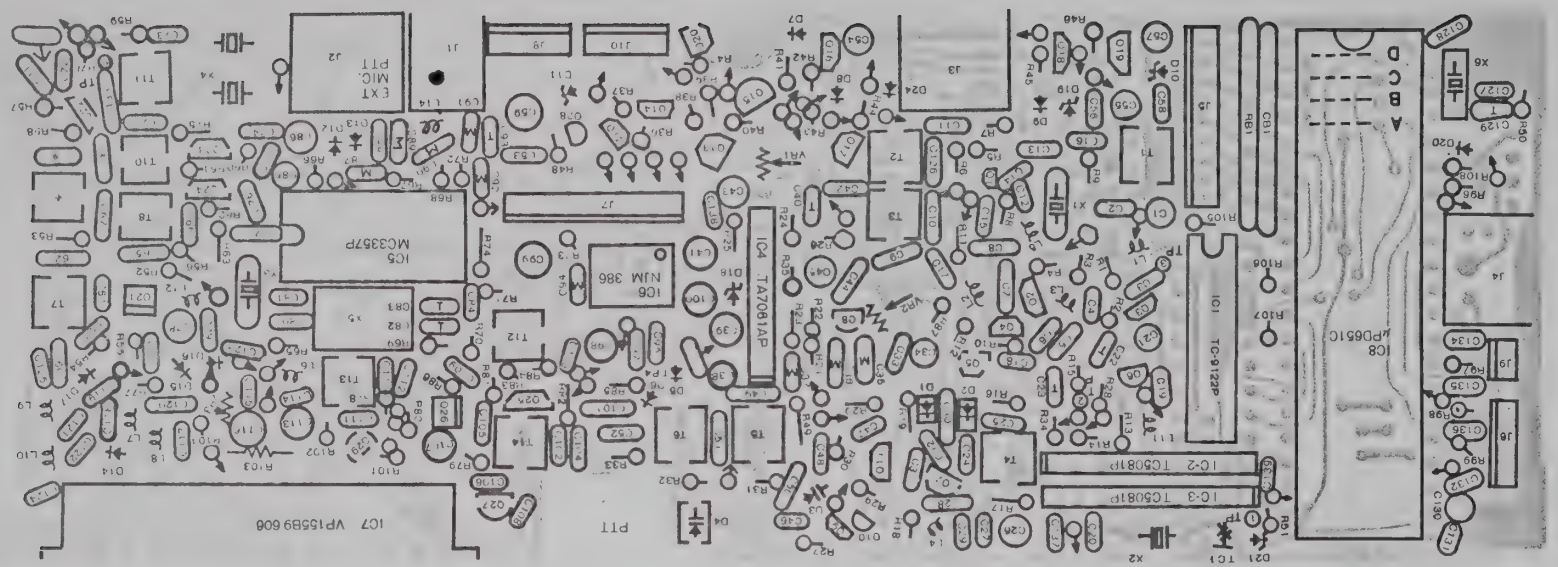
STEP	ADJUSTMENT	TEST POINT	PROCEDURE
6	VR1 VR2 FM Freq. Deviation	ANT.	1. Apply 1kHz, 30mV modulation signal to MIC input circuit. 2. Connect 50 ohm non-radiation resistive dummy load and Deviation meter to the ANT connector. 3. Adjust VR2 to obtain frequency deviation of ±5kHz. 4. Reduce modulation signal level to 3mV, and adjust VR1 to obtain frequency deviation of ±3.5kHz.
7	T13, T14 VR3 RF Power Output	ANT.	1. Set channel selector to channel "06". 2. Connect wattmeter (50 ohm) to ANT connector. 3. Place HI-LO power switch in HI position and set the unit to transmit mode of operation. 4. adjust T13 and T14 to obtain power reading of 2.5W on the watt meter. 5. Place the HI-LO switch in LO position and adjust VR3 to obtain power reading of 0.6W.

Schematic Diagram

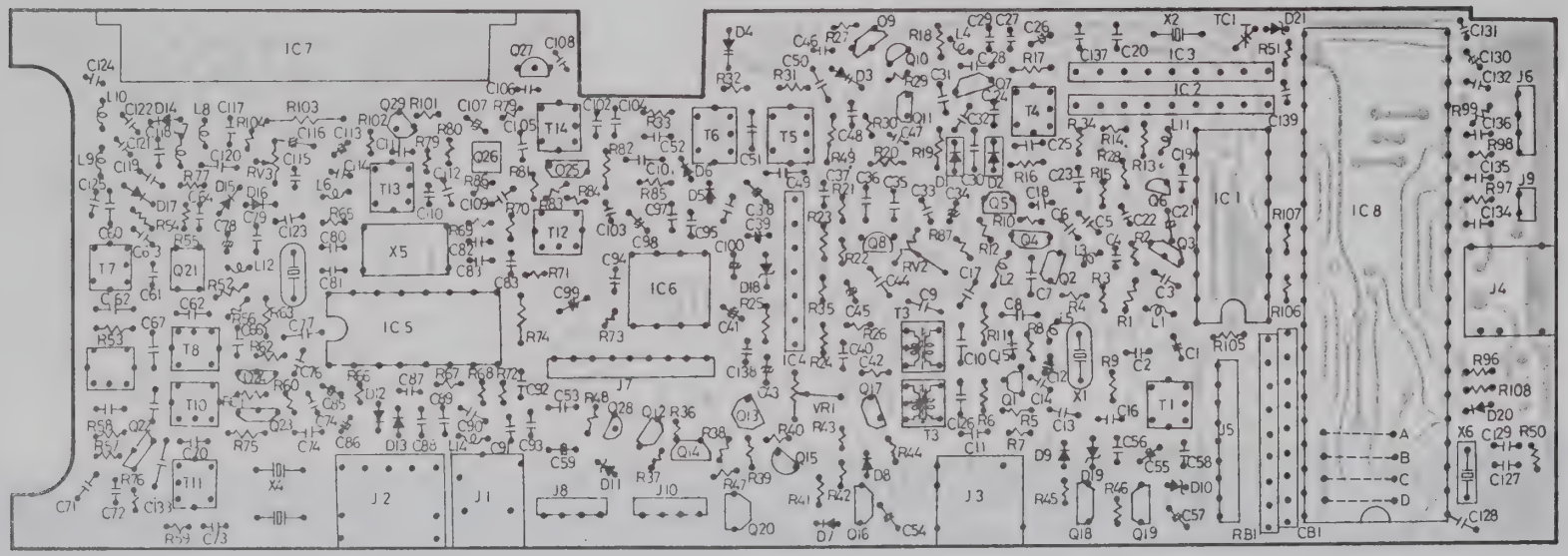


PC Board Detail

Top View



Bottom View



Parts List

General

ASSEMBLY CODE	ASSEMBLY NAME
FMA01AACAL1	ELEC. ELEMENTS

SYMBOLIC OR EXPLODED VIEW NO.	PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
	NSP0001763	CH. SEL. UNIT	CHANNEL SELECTOR UNIT
	NSP0001764	VR.	10K OHMS A
	NSP0001765	VR.	10K OHMS B
	NSP0001766	SLIDE SWITCH	SSH-23-05
	NSP0001767	PUSH SWITCH	SPJ3-H
	NSP0001768	MICRO SWITCH	
	NSP0001769	BNC CONNECTOR	
	NSP0001770	SPEAKER	50 M/M WATERPROOF
	NSP0001771	MIKE UNIT	
	NSP0001772	L.E.D. (RED)	SLP155B
	NSP0001773	L.E.D. (GREEN)	SLP255B
	NSP0001774	ANTENNA COIL	
	NSP0001775	CERAMIC CAP.	1000PF 50V
	NSP0001776	CERAMIC CAP.	22PF 50V
	NSP0001777	2P CONN. ASSY.	
	NSP0001778	4P CONN. ASSY.	
	NSP0001779	4P CONN. ASSY.	
	NSP0001780	4P CONN. ASSY.	
	NSP0001781	9P CONN. ASSY.	
	NSP0001782	9P CONN. ASSY.	
	NSP0001783	P.W.BOARD ASSY.	

Mechanicals

ASSEMBLY CODE	ASSEMBLY NAME
FMA01AACAL2	MECH. ELEMENTS

SYMBOLIC OR EXPLODED VIEW NO.	PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
	NSP0001784	FRONT CASE	
	NSP0001785	REAR CASE	
	NSP0001786	BATTERY COVER	
	NSP0001787	TOP PANEL	
	NSP0001788	PUSH-TALK KNOB	
	NSP0001789	SLIDE SW KNOB	
	NSP0001790	PUSH BUTTON	
	NSP0001791	VR. KNOB	
	NSP0001792	CHASSIS	
	NSP0001793	CH. SEL. HOLDER	L AND R PAIR
	NSP0001794	PWR JACK CAP	
	NSP0001795	TALK SW SPRING	
	NSP0001796	CHG JACK CAP	
	NSP0001797	PIN JACKS CAP	
	NSP0001798	SER. NR. PLATE	
	NSP0001799	NET (MIC UNIT)	
	NSP0001800	NET (SPKR)	
	NSP0001801	CUSHION (BATT.)	
	NSP0001802	CUSHION (REAR)	
	NSP0001803	CUSHION (PWR J)	
	NSP0001804	CUSHION (BNC)	
	NSP0001805	WATERPROOF (VR)	
	NSP0001806	TALK SW NET	
	NSP0001807	INSULATOR	
	NSP0001808	SHIELD CASE	
	NSP0001809	BNC CONN.SPACER	
	NSP0001810	SHIELD SHEET	
	NSP0001811	BAT.COVER SCREW	
	NSP0001812	E-STOP RING	2 M/M
	NSP0001813	CS-STOP RING	2 M/M
	NSP0001814	NUT	M1.2
	NSP0001815	NUT	M2
	NSP0001816	NUT	M2.6
	NSP0001817	FLAT WASHER	2 M/M
	NSP0001818	GND LUG	2 M/M
	NSP0001819	CYL. HD. SCREW	M1.2 X 10 BS (-)
	NSP0001820	CYL. HD. SCREW	M2 X 3 BS-CR (-)
	NSP0001821	PAN HD. SCREW	M2 X 3 BS-CR (+)
	NSP0001822	TAP SCREW	M2 X 4 BS-CR (+)
	NSP0001823	PAN HD. SCREW	M2.6 X 4 BS-CR (+)
	NSP0001824	FLAT HD. SCREW	M2.6 X 5 SUS (+)
	NSP0001825	FLAT HD. SCREW	M2.6 X8 SUS (+)
	NSP0001826	PAN HD. SCREW	M2.6 X8 SUS (+)
	NSP0001827	PAN HD. SCREW	M3 X 6 SUS (+)
	NSP0001828	SET SCREW	M2.6 X 2 SWR-NI CUP

Accessories

ASSEMBLY CODE	ASSEMBLY NAME
FMA01AACAL5	ACCESSORIES.

SYMBOLIC OR EXPLODED VIEW NO.	PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
	NSP0001840	BELT CLIP	
	NSP0001841	HAND STRAP	
	NSP0001842	HELICAL ANTENNA	
	NSP0001843	BATTERY PACK	LABEL ATTACHED
	NSP0001844	CARRYING CASE	
	NSP0001845	BATTERY CHARGER	NAME PLATE ATTACHED

Electricals

ASSEMBLY CODE	ASSEMBLY NAME
NSP0001783	P.W.BOARD ASSY.

SYMBOLIC OR EXPLODED VIEW NO.		PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
		NSP0001847	P.W. BOARD	
		NSP0001931	HEAT SINK	
		NSP0001932	TEST POINT PIN	
		NSP0001933	SHIELD FRAME	
		NSP0001934	SHIELD PLATE	
CB1		NSP0001928	CAPACITOR ARRAY	0.001MFD X 8
C1		NSP0001916	ELYT. CAP.	10MFD 16V
C10		NSP0001902	CERAMIC CAP.	CH 5PF 50V
C100		NSP0001916	ELYT. CAP.	10MFD 16V
C101		NSP0001909	CERAMIC CAP.	SL 39PF 50V
C102		NSP0001901	CERAMIC CAP.	RH 3PF 50V
C105		NSP0001908	CERAMIC CAP.	SL 27PF 50V
C107		NSP0001915	ELYT. CAP.	33MFD 50V
C110		NSP0001901	CERAMIC CAP.	RH 3PF 50V
C113	C116	NSP0001916	ELYT. CAP.	10MFD 16V
C117		NSP0001904	CERAMIC CAP.	CH 15PF 50V
C120		NSP0001897	CERAMIC CAP.	SL 0.5PF 50V
C122	C124	NSP0001906	CERAMIC CAP.	CH 33PF 50V
C125		NSP0001903	CERAMIC CAP.	CH 10PF 50V
C126		NSP0001910	CERAMIC CAP.	UJ 33PF 50V
C127	C128	NSP0001912	CERAMIC CAP.	SL 100PF 50V
C129		NSP0001924	TANTALUM CAP.	1MFD 35V
C130		NSP0001916	ELYT. CAP.	10MFD 16V
C133		NSP0001897	CERAMIC CAP.	SL 0.5PF 50V
C14		NSP0001910	CERAMIC CAP.	UJ 33PF 50V
C15		NSP0001930	CERAMIC CAP.	UJ 56PF 50V
C2		NSP0001913	CERAMIC CAP.	YF 0.001MFD 50V
C20		NSP0001905	CERAMIC CAP.	CH 18PF 50V
C21		NSP0001915	ELYT. CAP.	33MFD 50V
C22		NSP0001925	TANTALUM CAP.	3.3MFD 35V
C23		NSP0001924	TANTALUM CAP.	1MFD 35V
C24		NSP0001906	CERAMIC CAP.	CH 33PF 50V
C25		NSP0001902	CERAMIC CAP.	CH 5PF 50V
C26		NSP0001916	ELYT. CAP.	10MFD 16V
C28		NSP0001902	CERAMIC CAP.	CH 5PF 50V
C29		NSP0001903	CERAMIC CAP.	CH 10PF 50V
C30	C31	NSP0001899	CERAMIC CAP.	CH 2PF 50V
C32				
C34		NSP0001914	ELYT. CAP.	1MFD 50V
C35		NSP0001921	MYLAR CAP.	0.033MFD 50V
C36		NSP0001918	MYLAR CAP.	0.0022MFD 50V
C37		NSP0001919	MYLAR CAP.	0.01MFD 50V
C38	C39	NSP0001916	ELYT. CAP.	10MFD 16V
C40		NSP0001922	TANTALUM CAP.	0.1MFD 35V
C41		NSP0001916	ELYT. CAP.	10MFD 16V
C43		NSP0001914	ELYT. CAP.	1MFD 50V
C45		NSP0001917	ELYT. CAP.	47MFD 16V
C48		NSP0001904	CERAMIC CAP.	CH 15PF 50V
C49		NSP0001899	CERAMIC CAP.	CH 2PF 50V
C5		NSP0001900	CERAMIC CAP.	CH 3PF 50V

Electricals

ASSEMBLY CODE	ASSEMBLY NAME
NSP0001783	P.W.BOARD ASSY.

SYMBOLIC OR EXPLODED VIEW NO.		PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
C51		NSP0001905	CERAMIC CAP.	CH 18PF 50V
C54	C55	NSP0001916	ELYT. CAP.	10MFD 16V
C57				
C59		NSP0001917	ELYT. CAP.	47MFD 16V
C6		NSP0001900	CERAMIC CAP.	CH 3PF 50V
C60		NSP0001904	CERAMIC CAP.	CH 15PF 50V
C61		NSP0001902	CERAMIC CAP.	CH 5PF 50V
C63		NSP0001907	CERAMIC CAP.	UJ 22PF 50V
C65		NSP0001902	CERAMIC CAP.	CH 5PF 50V
C67		NSP0001898	CERAMIC CAP.	CH 1PF 50V
C7		NSP0001899	CERAMIC CAP.	CH 2PF 50V
C70	C74	NSP0001902	CERAMIC CAP.	CH 5PF 50V
C78		NSP0001916	ELYT. CAP.	10MFD 16V
C8		NSP0001899	CERAMIC CAP.	CH 2PF 50V
C80		NSP0001912	CERAMIC CAP.	SL 100PF 50V
C81		NSP0001911	CERAMIC CAP.	UJ 47PF 50V
C82	C83	NSP0001922	TANTALUM CAP.	0.1MFD 35V
C84		NSP0001903	CERAMIC CAP.	CH 10PF 50V
C85	C86	NSP0001916	ELYT. CAP.	10MFD 16V
C87		NSP0001919	MYLAR CAP.	0.01MFD 50V
C88		NSP0001910	CERAMIC CAP.	UJ 33PF 50V
C89		NSP0001919	MYLAR CAP.	0.01MFD 50V
C9		NSP0001911	CERAMIC CAP.	UJ 47PF 50V
C90	C91	NSP0001919	MYLAR CAP.	0.01MFD 50V
C92		NSP0001921	MYLAR CAP.	0.033MFD 50V
C93		NSP0001923	TANTALUM CAP.	0.22MFD 35V
C94		NSP0001920	MYLAR CAP.	0.027MFD 50V
C98		NSP0001916	ELYT. CAP.	10MFD 16V
C99		NSP0001917	ELYT. CAP.	47MFD 16V
D1		NSP0001865	VARI-CAP DIODE	1SV50
D10		NSP0001872	DIODE	HZ7B2L
D11		NSP0001867	DIODE	HZ7A3
D12	D13	NSP0001866	DIODE	1N60
D14		NSP0001870	DIODE	M1301
D15	D16	NSP0001866	DIODE	1N60
D17		NSP0001871	DIODE	1S2588
D18	D19	NSP0001869	DIODE	HZ7C3L
D2		NSP0001865	VARI-CAP DIODE	1SV50
D20		NSP0001864	DIODE	1S1588
D21		NSP0001868	DIODE	HZ6A1L
D24		NSP0001873	DIODE	1N4002
D3	D4	NSP0001865	VARI-CAP DIODE	1SV50
D5		NSP0001871	DIODE	1S2588
D6	D7	NSP0001864	DIODE	1S1588
D8		NSP0001866	DIODE	1N60
D9		NSP0001864	DIODE	1S1588
IC1		NSP0001848	I.C.	TC9122P
IC2		NSP0001849	I.C.	TC5081P
IC3		NSP0001850	I.C.	TC5082P
IC4		NSP0001851	I.C.	TA7061AP

Electricals

ASSEMBLY CODE	ASSEMBLY NAME
NSP0001783	P.W.BOARD ASSY.

SYMBOLIC OR EXPLODED VIEW NO.		PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
IC5		NSP0001852	I.C.	MC3357P
IC6		NSP0001853	I.C.	NJM386
IC7		NSP0001854	I.C.	VP155B9.606
IC8		NSP0001855	I.C.	UPD651C-034
J1		NSP0001940	JACK	2.5 M/M
J10		NSP0001937	4P CONNECTOR	
J2		NSP0001939	STEREO JACK	3.5 M/M
J3		NSP0001941	DC JACK	
J4		NSP0001935	4P CONNECTOR	
J4		NSP0001941	DC JACK	
J5		NSP0001938	9P CONNECTOR	
J6		NSP0001937	4P CONNECTOR	
J7		NSP0001938	9P CONNECTOR	
J8		NSP0001937	4P CONNECTOR	
J9		NSP0001936	2P CONNECTOR	
L1		NSP0001894	CHOKE COIL	
L10		NSP0001895	RF COIL	
L11	L12	NSP0001894	CHOKE COIL	
L14	L2			
L3	L4	NSP0001893	CHOKE COIL	
L5	L6	NSP0001892	CHOKE COIL	
L7		NSP0001896	CHOKE COIL	
L8	L9	NSP0001895	RF COIL	
Q1		NSP0001856	TRANSISTOR	2SC2668 O-RANK
Q10		NSP0001859	TRANSISTOR	2SC2026
Q11		NSP0001856	TRANSISTOR	2SC2668 O-RANK
Q12		NSP0001861	TRANSISTOR	2SA562 O.T.M-RANK
Q13	Q14	NSP0001858	TRANSISTOR	2SC2458 Y-RANK
Q15		NSP0001861	TRANSISTOR	2SA562 O.T.M-RANK
Q16	Q17	NSP0001858	TRANSISTOR	2SC2458 Y-RANK
Q18	Q19			
Q2		NSP0001856	TRANSISTOR	2SC2668 O-RANK
Q20		NSP0001858	TRANSISTOR	2SC2458 Y-RANK
Q21		NSP0001863	TRANSISTOR	3SK77 G.R-RANK
Q22		NSP0001862	TRANSISTOR	2SK192A G.R-RANK
Q23	Q24	NSP0001856	TRANSISTOR	2SC2668 O-RANK
Q25				
Q26		NSP0001863	TRANSISTOR	3SK77 G.R-RANK
Q27	Q28	NSP0001858	TRANSISTOR	2SC2458 Y-RANK
Q29		NSP0001860	TRANSISTOR	2SA1048 Y-RANK
Q3		NSP0001857	TRANSISTOR	2SC2669 O-RANK
Q4	Q5	NSP0001856	TRANSISTOR	2SC2668 O-RANK
Q6		NSP0001860	TRANSISTOR	2SA1048 Y-RANK
Q7		NSP0001862	TRANSISTOR	2SK192A G.R-RANK
Q8	Q9	NSP0001858	TRANSISTOR	2SC2458 Y-RANK
RB1		NSP0001929	RESISTER ARRAY	47K X 8
TC1		NSP0001942	TRIMMER CAP.	30PF
T1		NSP0001880	RF.TRANSFORMER	
T10		NSP0001887	RF.TRANSFORMER	
T11		NSP0001890	RF.TRANSFORMER	

Electricals

ASSEMBLY CODE	ASSEMBLY NAME
NSP0001783	P.W.BOARD ASSY.

SYMBOLIC OR EXPLODED VIEW NO.		PART CODE	PART NAME	DESCRIPTION AND SPECIFICATIONS
T12		NSP0001891	RF.TRANSFORMER	
T13		NSP0001888	RF.TRANSFORMER	
T14		NSP0001889	RF.TRANSFORMER	
T2		NSP0001881	RF.TRANSFORMER	
T3		NSP0001882	RF.TRANSFORMER	
T4		NSP0001883	RF.TRANSFORMER	
T5		NSP0001884	RF.TRANSFORMER	
T6		NSP0001885	RF.TRANSFORMER	
T7		NSP0001886	RF.TRANSFORMER	
T8		NSP0001887	RF.TRANSFORMER	
VR1	VR2	NSP0001926	SEMI-FIXED VR.	1K OHM B
VR3		NSP0001927	SEMI-FIXED VR.	100K OHMS B
X1		NSP0001874	XTAL OSCILCATOR	33.650 MHZ
X2		NSP0001875	XTAL OSCILCATOR	12.800 MHZ
X3		NSP0001876	XTAL OSCILCATOR	10.245 MHZ
X4		NSP0001877	XTAL FILTER	
X5		NSP0001878	CERAMIC FILTER	
X6		NSP0001879	CER. RESONATOR	

CTX 1200

12 Channel
VHF/FM Marine
Radiotelephone

- Full 25 Watt transmit power
- Low power transmitter switch for in-harbor use
- Detachable microphone
- Front mounted speaker
- One crystal per channel programming